CRM D0009652.A4/1REV
May 2004

# Cost-Benefit Analysis of Lump Sum Bonuses for Zone A, Zone B, and Zone C Reenlistments: Final Report

Anita U. Hattiangadi • Deena Ackerman
Theresa H. Kimble • Aline O. Quester



CNA
4825 Mark Center Drive • Alexandria, Virginia 22311-1850

Approved for distribution: May

Henry S. Griffis

Henry S. Griffis, Director
Workforce, Education and Training Team
Resource Analysis Division

This document represents the best opinion of CNA at the time of issue.
It does not necessarily represent the opinion of the Department of the Navy.

CLEARED FOR PUBLIC RELEASE

Distribution unlimited. Specific authority: N00014-00-D-0700.
For copies of this document call: CNA Document Control and Distribution Section at 703-824-2123.

# REPORT DOCUMENTATION PAGE

*Form Approved OPM No. 0704-0188*



| | | |
|---|---|---|
| **1. REPORT DATE:** Mar 2004 | **2. REPORT TYPE:** Final | **3. DATES COVERED:** N/A |
| **4. TITLE:** Cost-Benefit Analysis of Lump Sum Zone A, Zone B, and Zone C Reenlistment Study: Final Report | | **5a. CONTRACT NUMBER:** N00014-00-0700<br>**5c. PROGRAM ELEMENT NUMBER:** 65154N<br>**5d. PROJECT NUMBER:** R0148 |
| **6. AUTHOR(S):** Hattiangadi AU, Ackerman D, Kimble TH, Quester AO | | |
| **7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES):**<br>Center for Naval Analyses<br>4825 Mark Center Drive<br>Alexandria, Virginia 22311-1850 | | **8. PERFORMING ORGANIZATION REPORT NO.:**<br>CRM D0009652.A4 |
| **9. SPONSORING AGENCY NAME(S) AND ADDRESS(ES):**<br>Deputy Commandant, Manpower and Reserve Affairs, HQMC<br>James Wesley Marsh Center<br>3280 Russell Road<br>Quantico, Virginia 22134-5103 | | **10. SPONSOR ACRONYM(S):** N/A<br>**11. SPONSOR REPORT NO.:** N/A |
| **12. DISTRIBUTION AVAILABILITY STATEMENT:**<br>Distribution unlimited | | **13. SUPPLEMENTARY NOTES:** N/A |

**14. ABSTRACT:** The Selective Reenlistment Bonus (SRB) program is the primary tool for shaping the career force. The first-term, or Zone A, SRB is key because it is the only point at which recommended and eligible Marines can be denied reenlistment in a skill area (PMOS) if their numbers would exceed requirements.
In this paper, we find that SRB multiples have a large effect on reenlistment rates by occupation. Additionally, lump-sum SRBs have a larger effect on reenlistment rates than those paid in timed installments. We estimate a model that includes factors influencing the reenlistment decision separately for Zones A, B, and C. Results suggest that SRBs significantly raise reenlistment rates in all zones. Furthermore, the switch to lump-sum SRBs had fairly dramatic effects on program costs. We estimate the Marine Corps saved $8 million in Zone A and $10.4 to $25.7 million in Zone B by offering lump-sum rather than timed bonuses in FY03.

We estimate predicted reenlistment rates by occupational field and bonus level and a decision model that strength planners can use to set Zone A SRB levels by PMOS. Finally, we compare the relative costs and benefits of SRBs versus lateral moves for filling boatspaces in undermanned areas.

**15. SUBJECT TERMS:** SRB, reenlistment, occupation, lateral move, bonus, lump-sum

| | | |
|---|---|---|
| **16. SECURITY CLASSIFICATION:**<br>**a. REPORT:** Unclassified<br>**b. ABSTRACT:** Unclassified<br>**c. THIS PAGE:** Unclassified | **17. LIMITATION OF ABSTRACT:**<br>SAR | **18. NUMBER OF PAGES:** 140<br>**19. NAME/PHONE OF RESPONSIBLE PERSON:**<br>Henry S. Griffis, (703) 824-2208 |

Standard Form 298 (Rev. 8-98)Prescribed by ANSI Std. Z39.18

# Contents

# Executive summary

The Selective Reenlistment Bonus (SRB) Program is the primary tool for affecting reenlistment rates and shaping the career force. Because the Marine Corps does not permit lateral entry, it is only through careful management of recruiting and reenlistments that planners can control the supply of Marines into required skill areas (PMOSs).

The first-term, or Zone A, SRB Program is of particular importance because it is the only time that *recommended and eligible* Marines can be denied the opportunity to reenlist if their numbers would exceed requirements. *All* recommended and eligible Marines are allowed to reenlist at later reenlistment points, but SRBs are still needed to encourage reenlistments in PMOSs that fall short of requirements.

In this paper, we review the literature on the relationship between SRBs and reenlistment rates. We find that in both the Marine Corps and other Services, SRB multiples have a substantial effect on reenlistment rates by occupational field. In addition, the literature shows that lump-sum SRBs have a larger effect on reenlistment rates than SRBs that are paid in timed installments.

The Marine Corps benefited from the switch to lump-sum SRBs in two ways. First, the switch gave the Marine Corps greater control over its SRB budget when faced with unexpected (or expected) future congressional budget cuts. Before the switch to lump sum, substantial portions of the Marine Corps' SRB budget were already committed in anniversary payments for those who had reenlisted in previous years. As a result, a budget cut meant that the full decrease had to be absorbed by the current year's program. This effectively doubled the size of the "hit" and severely limited the Marine Corps' ability to influence reenlistment rates in the year of the cut. Now that the transition to lump-sum SRBs is complete, none of the SRB budget is already committed for prior-year reenlistments. Second, the Marine Corps saves money by using lump-sum bonuses. As long as Marines' personal discount rates are greater than the Federal Government's discount rate, the lump-sum SRB Program is cost-effective. The nominal Federal Government's discount rate is currently 4.75 percent, and our estimates of Marines' personal discount rates go well above this.

One goal of this study was to estimate a model that could produce predicted reenlistment rates by occupational field and bonus level annually. Using a Military/Civilian Pay Ratio Model rather than the more prevalent Annualized Cost of Leaving (ACOL) Model allowed us to develop a model that is easily updated and can directly measure the impact of SRB dollars on reenlistment rates. We estimated our model, which includes a variety of factors and characteristics that influence the reenlistment decision, separately for Zones A, B, and C using maximum likelihood techniques. Our dataset, constructed from a variety of sources, includes information for each reenlistment decision from FY80 to FY03. We matched economic variables and the SRB multiple faced by the Marine to demographic and Service-specific information about the Marine at the time of the decision.

We estimated two reenlistment models for each zone using a logit specification in which the dependent variable is the reenlistment decision and the independent variables included the demographic, economic, and occupational controls. The first specification controlled for occupation; the second omitted the occupational variables. Both specifications allowed us to isolate the effect of increasing the SRB multiple net of any effects associated with relative rank, relative pay, or personal characteristics. The first specification is the one we use to establish predicted reenlistments by occupational field and SRB level.

Taken together, the regression results suggest that SRBs significantly raise reenlistment rates in all three zones. For each increase in the SRB level, the reenlistment effect was 6.6 percentage points (Zone A), 7.2 percentage points (Zone B), and 3.5 percentage points (Zone C). Further, the switch to lump-sum SRBs had dramatic effects on reenlistment rates: 10.7 percentage points in Zone A and 6.2 percentage points in Zone B.[1] We also estimated the discount rates for Marines implied by these results. The implied discount rate for Zone A

1. Results for the lump-sum SRB in Zone C are not statistically significant, perhaps because we have so few Zone C SRBs in the lump-sum years.

Marines is also very large—154.6 percent—whereas implied discount rates for Zone B and C Marines seemed more reasonable (18.5 percent and 14.3 percent, respectively).[2]

We also estimated how much the Marine Corps saved in FY03 by offering lump-sum bonuses. We find that it would have cost the Marine Corps at least $8 million more—or 30 percent of the Zone A SRB budget—to get the same number of Zone A reenlistments under anniversary payments as it got under the lump-sum payment plan. In Zone B, the cost under anniversary payments would have been $10.4 to $25.7 million more than under lump-sum payments.

We developed occupational field (occfield) reenlistment prediction models for each zone. These prediction models isolate the impact of different SRB multiples on reenlistment probabilities for each separate occfield. To forecast reenlistments, CNA will forecast the male unemployment rate for an appropriately aged cohort and the military-to-civilian pay ratio. Once these variables have been forecasted and inserted into the model, a table is produced that shows the forecasted reenlistment rates by occfield. The strength planner uses this table to assign SRB levels by PMOS. To further assist the strength planner in Zone A bonus assignments, we developed an automated mechanism (decision model), which factors in the budget constraints as well as the desired reenlistments by PMOS.

As part of this study, we developed a validation method, which allows for measurement of the model's performance, and a calibration method, which suggests when it may be appropriate to reestimate the model. Finally, we compared the relative costs and benefits of SRBs versus lateral moves for filling boatspaces in undermanned areas. Using very rough estimates of the training and current and future readiness costs of lateral moves, we develop lateral-move cost estimates that SRB planners can use to help guide their thinking about lateral moves.

2. We realize that the Zone A discount rate is implausibly high and that our dummy variable is probably picking up more than the lump-sum effect. We recommend reestimating the model when more data are available.

# Introduction

The Selective Reenlistment Bonus (SRB) program is the primary tool available to Marine Corps Planners for affecting reenlistment rates and shaping the career force. Because the Marine Corps does not permit lateral entry into the Corps, it is only through careful management of recruiting and reenlistments that planners can control the supply of Marines into all required skill areas.

The first-term, or Zone A, SRB Program is of particular importance because it is only at this juncture that *recommended and eligible* Marines can be denied the opportunity to reenlist if their numbers would exceed requirements.[3] At Zone A, Marine Corps planners specify the number of Marines in each PMOS that can reenlist. These PMOS "boatspaces" are based on career force requirements. Thus, planners use this first reenlistment opportunity to shape the career force by encouraging reenlistments with SRBs in some PMOSs while restricting reenlistments in other PMOSs. In Zones B and C, *all* recommended and eligible Marines can reenlist, but SRBs are still needed to encourage reenlistments in PMOSs that fall short of requirements.

Figures 1 through 3 show those reenlisting with an SRB as a share of all those reenlisting by zone between FY85 and FY03 (the time period analyzed). The figures show that SRBs (particularly in Zone A) were used to a much lesser extent during the period of the military drawdown.

---

3. If the Services are formally reducing endstrength, additional policies will restrict first-term and career-force reenlistments. By law, SRB Zone A (first-term) reenlistments are from 21 months to 6 years of service. SRB career force reenlistments are Zone B (6 to 10 years of service) and Zone C (10 to 14 years of service). SRBs are not permitted for reenlistments after 14 years of service.

Figure 1. SRB reenlisters as a percentage of all reenlisters: Zone A

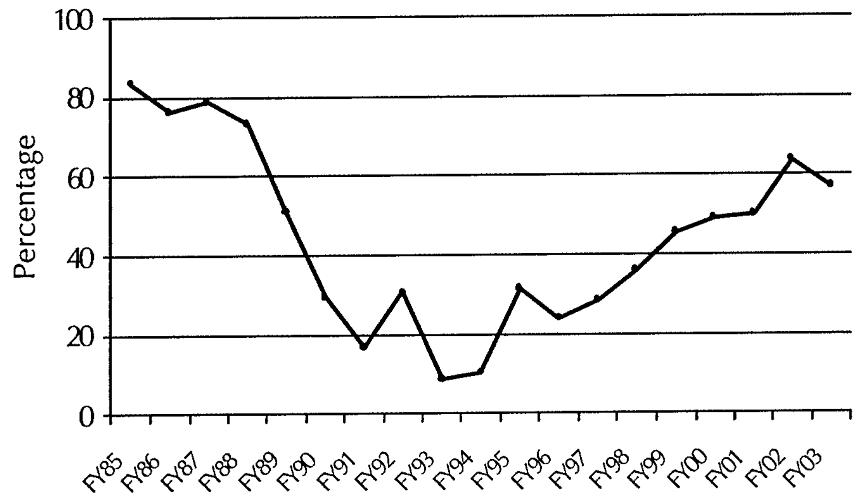



Figure 2. SRB reenlisters as a percentage of all reenlisters: Zone B

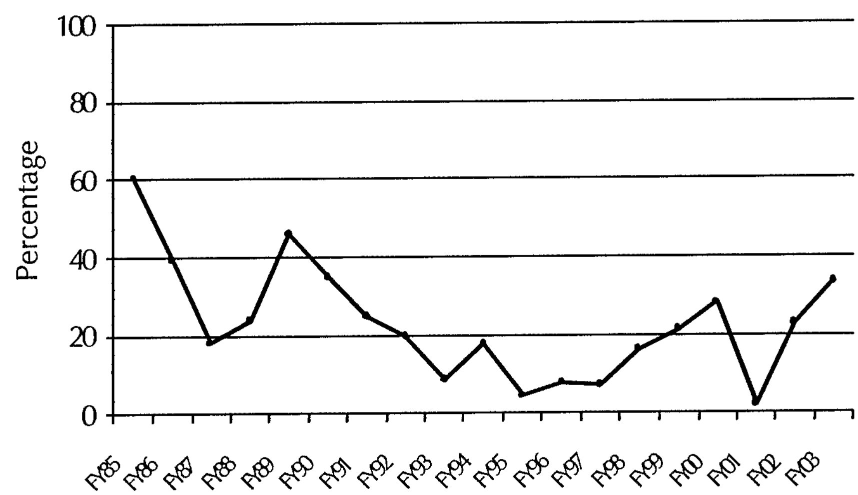
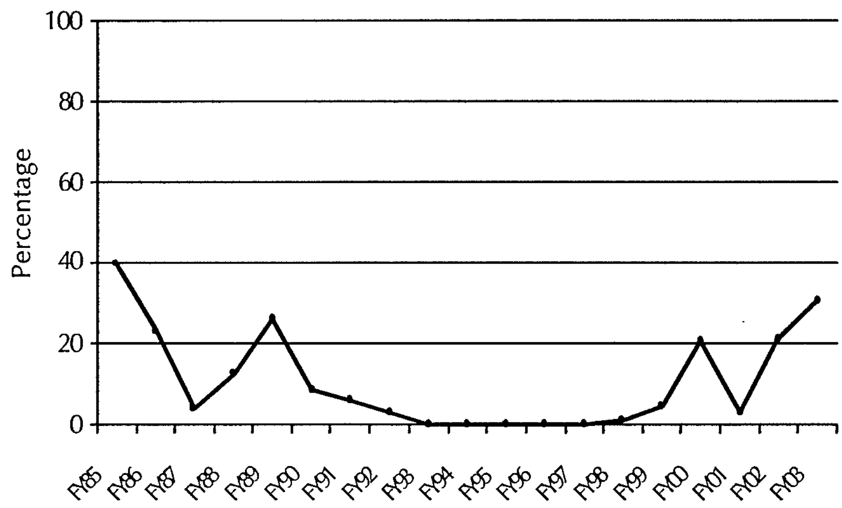


Figure 3. SRB reenlisters as a percentage of all reenlisters: Zone C




In this paper, we will:

- Present a literature review on the relationship between selective reenlistment bonuses and reenlistment rates.
- Discuss the Marine Corps' gains from switching to a lump-sum payment plan.
- Discuss the dataset, model, and variables used.
- Report our estimated logistic regression models for Zone A, Zone B, and Zone C reenlistments.
- Discuss our occupational field (occfield) reenlistment prediction models for each zone. These prediction models isolate the impact of different SRB multiples on reenlistment probabilities. Annual updates of these prediction models will be provided to the SRB planner.[4]

4. Ross (2000) describes the current process that begins with CNA providing the Marine Corps with a spreadsheet model prediction. Our new prediction model will replace the earlier model.

- Describe the automated mechanism (decision model) developed, which helps planners to assign bonus levels using the prediction models.

- Present a validation and calibration method. The validation method allows for measurement of the model's performance, and the calibration method suggests when it may be appropriate to reestimate the model.

- Discuss the relative costs and benefits of SRBs versus lateral moves for filling boatspaces in undermanned areas.

# The Selective Reenlistment Bonus (SRB) Program

## Program history

The SRB Program began in 1965 to combat cross-Service problems in first-term retention and career manning. Difficulties were especially acute among those in technical fields with the highest training costs.

The SRB Program's rules and guidelines have changed repeatedly over the ensuing years. For example, reenlistment bonuses were paid in equal installments over the course of the contract in some periods; in other periods, individuals received lump-sum payments. Ross (2000) and Barry (2001) present very detailed descriptions of the program's history.

Historically, bonuses have been used to target skill areas with low reenlistment rates. Two skill areas fall into this category. First, bonuses are offered with higher multiples in more technical PMOSs. People in these skill areas have developed skills that are highly valued in the civilian economy and, therefore, have the best civilian alternatives. Second, those in PMOSs considered to have particularly challenging work conditions commonly receive bonuses. In such cases, bonuses can be seen as compensation for arduous job conditions. Marines with IT training fit into the first category; riflemen are an example of the second.[5]

5. Both arguments for increased wages are described in labor economic textbooks. For example, see Ehrenburg and Smith (2000)—Chapter 9 for a discussion of investments in human capital and Chapter 10 for a discussion of compensating wage differentials. Hosek and Totten (1998) illustrate this effect in a cross-Service study that examines the effect of "long and hostile" deployments on reenlistment rates.

## Program cost

The SRB Program is expensive. In FY02, the Marine Corps program spent $61 million and the FY03 allotment was $60 million. It is the largest discretionary item in the Marine Corps' manpower (MPMC) account and is often targeted for cuts to offset budget shortfalls in other areas.[6] The cost of the program has varied over time: it decreased during the drawdown but increased rapidly during the last economic boom. Both Congress and the General Accounting Office (GAO) expressed concern about the management of the program in the mid-1990s and are taking a similar interest now.[7]

## Bonus payments

Recommended and eligible Marines who reenlist in a PMOS offering an SRB receive the bonus according to the following rule:

SRB payment = MBP* Years* SRB multiple,

where:

- MBP is monthly base pay as calculated by the basic pay table,
- Years is the number of additional obligated service years in the new contract, and
- SRB multiple is the bonus multiple.

Currently, the bonus multiple is a number between 0 and 5 (MOSs offering a multiple of 0 are not currently paying a bonus).

Bonuses can be quite large. For example, in FY00, the average bonus payment to those with a multiple of 5 was $29,946; a multiple of 1

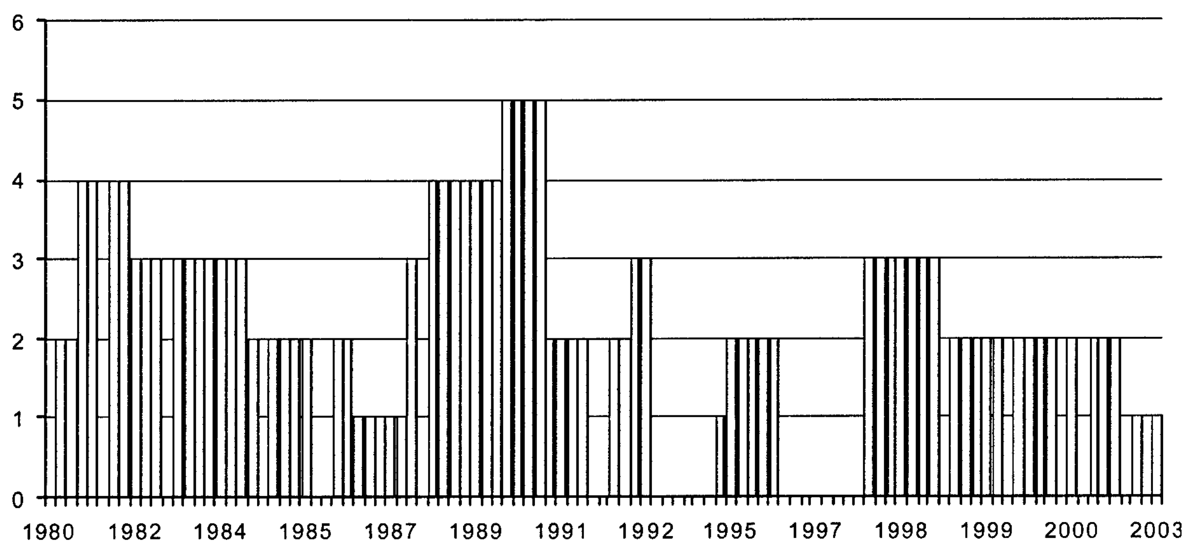
6. The Marine Corps, however, relies on SRBs less than other Services do and its SRB budget is smaller (relative to Manpower accounts) than those of other Services. For example, the Navy approved over 17,000 SRB reenlistments at a cost of $192 million in FY02 (http://www.chinfo.navy.mil/navpalib/cno/cno-top5-report2003.html).

7. See U.S. GAO (1995) and U.S. GAO (2002).

averaged $5,989.[8] Current Marine Corps Policy caps multiples at 5, although Department of Defense policy permits multiples between 0.5 and 15.[9] Marine Corps policy capped SRB payments at $30,000 in Zone A and $35,000 in Zones B and C in FY03.

Figures 4 through 7 show Zone A bonus multiples for four PMOSs. These figures illustrate the volatility in bonus levels offered over time, as well as differences in average rates across PMOSs.[10]

Figure 4. Zone A SRB levels for PMOS 5711: nuclear, biological and chemical defense specialists




8. Half of this bonus would have been paid up front with the rest paid in equal sized anniversary payments. See Ross (2000), p. 44, for a table of average bonus payments in FY00.
9. The Marine Corps has paid bonus multiples as high as 6 in our sample period, but not for at least the last 10 years.
10. The bars in these figures are presented chronologically, but they do not accurately reflect the passage of time. Each bar represents an announcement, so some years are represented by more than five bars while others appear only once.

Figure 5. Zone A SRB levels for PMOS 0311: riflemen

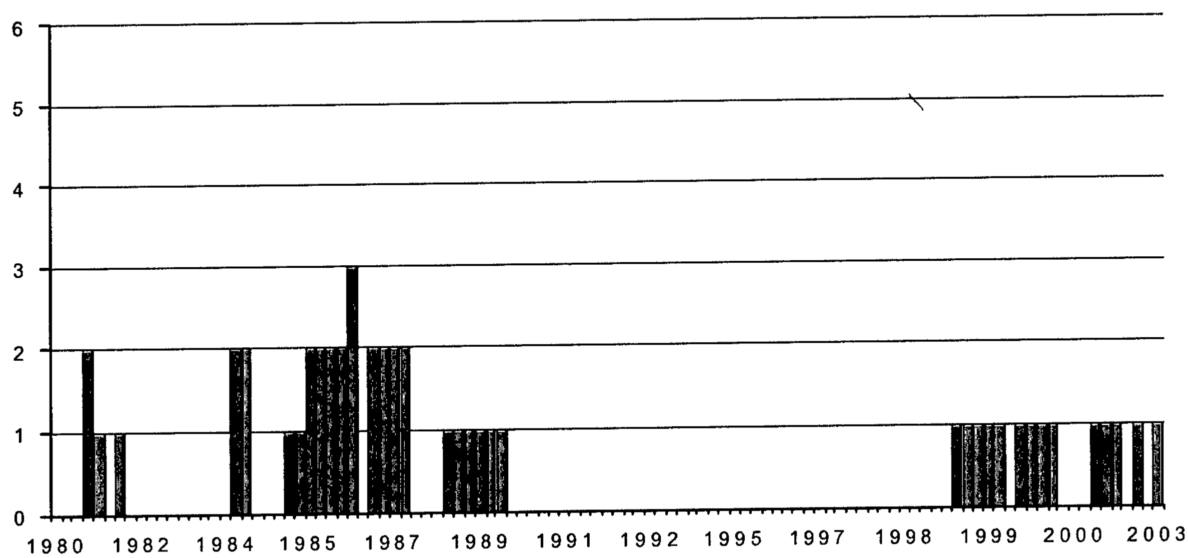



Figure 6. Zone A SRB levels for PMOS 7372: first navigators

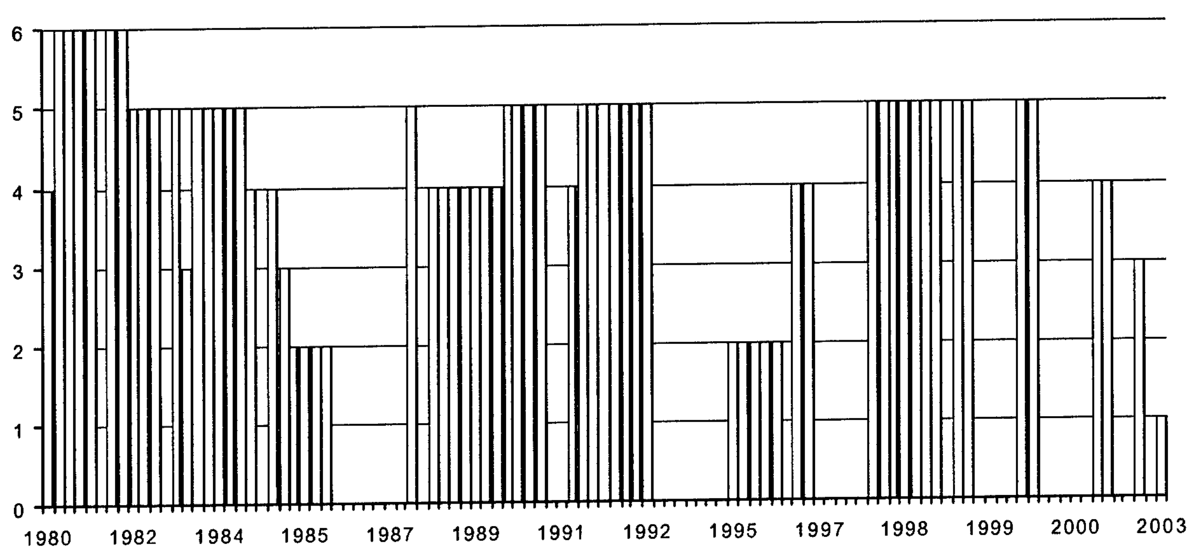
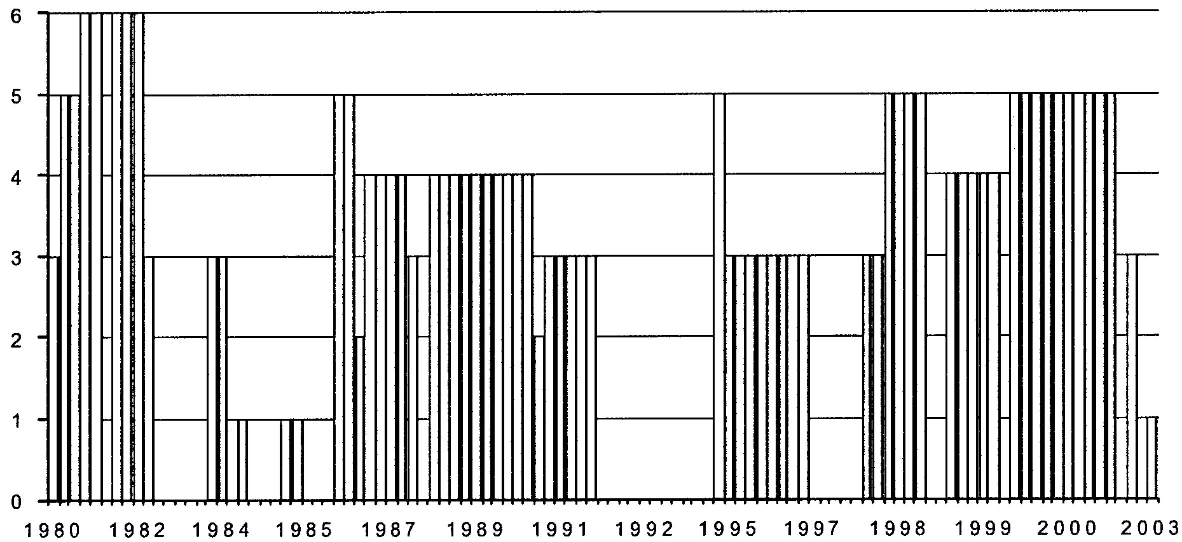


Figure 7. Zone A SRB levels for PMOS 2887: counter mortar radar repairers




The SRB program has an important effect on reenlistments. We estimate that without it, the Marine Corps would have been 1,271 Marines short of its 2003 FTAP reenlistment requirements.

## Recent program changes

In response to the increasingly difficult retention climate during the last economic boom, the Marine Corps instituted three changes to the SRB Program in FY01:

- SRBs would henceforth be paid as lump sums at the reenlistment point, rather than over time through a timed-payment plan.
- More bonus funds would be distributed toward Zones B and C.
- Contract rules would permit slightly larger bonus payments and slightly longer total commitments.

The first change was a switch from a timed-payment plan to a lump-sum payment at the reenlistment point. Under the old payment scheme, an individual received half of the bonus at the reenlistment point, with the rest paid out in equal-sized anniversary payments. At present, the Marine Corps is the only Service using lump-sum SRBs.

A second change to the SRB Program marks a redistribution of bonus funds toward career Marines (those in Zone B and Zone C) by increasing the maximum payment per bonus in these zones from $20,000 to $35,000. Although the cap was raised 2 years ago, only in FY03 were payments in these zones expected to account for a substantial share of the SRB budget.[11] This change was a response to increasing difficulties in retaining career force members as well as increased requirements.[12]

The third SRB Program change involves contract lengths. Previously, a Marine reenlisting before the end of his or her contract would receive a bonus based on the number of months in the new contract *less the number of months remaining in the original contract* because the total obligation would be less than two completed contracts. Under new rules, a Marine committing to a new contract before the previous contract ends can commit to fulfilling his or her obligation as if the new contract started *after* the end of the first.[13] The Marine would receive a bonus at reenlistment based on the number of years in the new contract, and serve for the total number of years in both contracts. This maximizes the length of the combined commitment and substantially increases the value of the SRB to the Marine.

11. FY03 SRB expenditures were 59 percent for Zone A, 25 percent for Zone B, and 16 percent for Zone C.

12. The Marine Corps currently expects to increase top six from 51.9 percent of the enlisted force to 52.2 percent.

13. Before FY01, if a Marine with a 4-year contract reenlisted for another 4-year contract 3 months before the end of his or her first contract, the Marine would receive a bonus equal to MBP*MULT*(3.75) and would serve a total of 7 years and 9 months. Under the new rules, this Marine would have the option of receiving a bonus equal to MBP*MULT*4 and would serve a total of 8 years.

# Literature review

## Analyses of the impact of the Marine Corps' SRB Program

The effects of the Marine Corps' SRB Program on reenlistment rates have been analyzed several times over the years. We first describe North (1994) in some detail because it estimates the model from which predictions on reenlistment responses to SRBs are currently derived. It is also one of the few SRB studies that develops a prediction model to help planners set SRB levels.[14]

North examines a sample of recommended and eligible Marines who made Zone A decisions between October 1986 and September 1992. The sample is further limited to Marines who were "unrestricted" in their decision, meaning that their PMOSs were not oversubscribed. North estimates the probability of reenlisting as a function of a pay index (military pay relative to the civilian earnings of similar individuals) and the SRB multiple offered. Variables for individual characteristics (like test scores and marital status), occupational information (occfield), and economic conditions (the unemployment rate) are also included.[15] North finds that bonus multiples have a substantial effect on reenlistment rates by occupational field; he estimates a 4- to 10-percentage-point increase in predicted reenlistment rates from a one-level SRB increase.[16]

14. Cymrot (1987) developed a spreadsheet model, but it did not include easily updatable variables. No other studies seem to have gone further than an analysis of the relationships.

15. North recognizes that earlier work uses an Annualized-Cost-of-Leaving (ACOL) framework, but he chooses this approach because of the focus on forecasting (which requires easily updatable variables). The ACOL Model cannot be updated easily, as discussed in a later section.

16. Not all SRB/reenlistment rate combinations will have been observed. For example, the Marine Corps does not allow the payment of SRBs to those in the Marine Corps Exchange (occfield 41) or Music (occfield 55) occupational fields.

North also examines the implied costs of each induced enlistment. Costs result because bonuses are paid to *all* who reenlist while the bonus is in effect—even those who would have reenlisted without the bonus. As a result, as reenlistment rates in a given occfield rise, the costs of each induced enlistment rise even faster.

In an earlier publication, Quester and Adedeji (1991) estimate a model similar to North's. In addition to SRBs, they focus on the effect of grade and dependency status on reenlistment. Like North, they use a military-to-civilian pay index to capture the effects of pay on the reenlistment decision. However, their sample period is different—Zone A decisions in the FY80 to FY90 period.

Quester and Adedeji find that SRBs exert a "strong and regular impact on the decision to reenlist." Each bonus multiple increases the probability of reenlistment by about 6 percentage points and the effect is nearly linear. Furthermore, they find that married Marines and those with dependents are more likely to reenlist, and that SRBs significantly affect the reenlistment of Marines in the highest test-score category. Reenlistment rates for Marines in PMOSs not offered an SRB are 24.6 percent over the period, but 34.5 percent for Marines in PMOSs offered a level-one bonus.

A study by Cymrot predates the work of Quester and Adedeji. Cymrot (1987) has goals similar to those of later studies and, like North, supplied Marine Corps planners with a spreadsheet for making decisions. Using data from 1980 to 1985, Cymrot evaluates the impact of SRBs on reenlistment rates separately for each zone and skill family combination.[17] A key feature of this study is that the period of analysis contains intervals when bonuses were suspended due to depleted funds—a source of variation that is exploited in the model. Suspension periods were short but are notable for the resulting decreases in reenlistments.[18] Cymrot estimates the probability that a Marine reenlists using an ACOL Model, which collapses all information regarding lifetime earnings in the military and in the civilian sector into one variable.[19]

17. A skill family is a group of similar PMOSs.

18. Suspension periods are exploited similarly in Quester and Adedeji (1991) and North (1994).

19. The ACOL Model is discussed further in a later section.

Quester and Lawler (1992) studied career reenlistments (Zones B and C) as part of a comprehensive analysis of Marines' reenlistment behavior. The work, however, did not supply a working model to planners. The focus of this research was the impact of marital status and the changing rank distribution on career reenlistments.

Consistent with other research, Quester and Lawler find that bonuses increase reenlistment rates (by 6 percentage points in Zone B and by 5 percentage points in Zone C). They note that the diminished effect of bonuses in Zone C should be expected because of higher initial reenlistment rates and the decreased importance of bonuses relative to retirement incentives.

Quester and Lawler also investigate the costs of each induced reenlistment, noting that costs are high due to very high initial reenlistment rates in these zones. Like other reenlistment studies from this period, this study models military compensation as a function of military and civilian pay and includes bonuses as separate regressors.

## Studies of SRBs' impact for other Services

The extensive literature estimating the effect of changes in compensation on reenlistment rates in other Services is well summarized in Goldberg (2001). Although Goldberg's focus is broader than just the SRB, his detailed review shows the SRB as part of the total pay package.

Goldberg's primary measure is the *pay elasticity of reenlisting*—the percentage increase in the reenlistment rate due to a percentage increase in compensation. The elasticity can be computed with respect to changes in SRB levels, basic pay, or any other element of compensation included in the model. Overall pay elasticity assumes that each dollar of compensation—whether in bonus, basic pay, housing allowances, or anything else—has the same impact on behavior. Although economists commonly make this assumption, we do not want to assume *a priori* that SRB dollars have the same retention impact as other forms of compensation. Goldberg reviews many studies on pay elasticities, but we examine only those that directly discuss implications for SRB payments.

A study by Hansen (2000) stresses that pay elasticities vary greatly across Navy occupations (ratings)—between .23 and .53. To conduct this analysis, Hansen matched Navy ratings to civilian alternatives based on the skills required in both jobs.[20] This allows him to estimate a more nuanced set of predicted civilian earnings for each individual and, hence, a more precise characterization of compensation. Hansen employs a military-to-civilian pay ratio where civilian pay varies by rating.

Building on this work, Hansen and Wenger (2001) recently conducted a large scale pay elasticity study for the Navy using the ACOL framework.[21] The study reviews and synthesizes 20 years of pay elasticity estimates. Through careful estimation of a baseline model and systematic exploration of assumptions, Hansen and Wenger provide insight into the sources of variation in estimates of Sailor sensitivity to pay changes that are due to researchers' modeling assumptions rather than changes in Sailors' underlying preferences. They compute an SRB "elasticity," finding that a one-level increase in SRBs yields a 2.5-percentage-point increase in enlisted Sailors' reenlistment rates.[22] This elasticity is slightly higher than historical estimates discussed in Goldberg (2001), but far smaller than estimates in Quester and Adedeji (1991) and North (1994).[23]

20. The set of Navy ratings used in this study is very limited due to the difficulties in matching military ratings with occupations in the civilian market, and would be difficult to generalize.

21. The ACOL framework is described in more detail in a later section.

22. They do not explicitly include SRB levels as regressors, but as a component of their compensation variable. The assumption is that an SRB dollar and a basic pay dollar will have the same effect on retention.

23. The Marine Corps currently uses estimates in North (1994). We do not know the extent to which Marines may be more or less sensitive than Sailors to SRBs because the Services apply their programs differently. We also do not know how much of the difference may be due to different responses to SRB dollars than to basic pay dollars; the Navy studies assume that responses to all dollars are the same, whereas Marine Corps studies have allowed SRB dollars to have differential impacts.

Goldberg and Warner (1982) offer an early example of a study that examines the reenlistment effects of the Navy's SRB Program. They estimate the SRB's effect on a trichotomous choice—to reenlist, to extend one's contract for an additional year or two, or to leave.[24] They combine Navy ratings into nine skill-based categories, and find that increasing bonus multiples has a meaningful effect on expected reenlistment rates. They warn, however, that their estimated pay elasticities will vary with military occupation.

Hosek and Peterson (1985) estimate the value of SRBs across Services and for all zones. They find that a one-level increase in bonus level will induce a 1.8-percentage point increase in Zone A reenlistments under a delayed payment plan. Estimates for Zones B and C are slightly larger.

Finally, Warner and Goldberg (1984) estimate the elasticity of Sailors' labor supply using data from the same period. They find that Sailors whose occupations entail more sea duty than average have lower pay elasticities. In other words, sea-intensive Sailors are less responsive to pay increases than Sailors who average less sea duty. A policy implication of this result is that higher bonuses are required in sea-intensive occupations to compensate Sailors for their job conditions.

24. Although the extension vs. reenlistment question was important in this earlier period, it is not relevant today. The Marine Corps grants very few extensions, and nearly all those granted are short term and given with the understanding that the extender will not reenlist at its end.

# Examination of lump-sum SRBs versus timed payments

## The personal discount rate

The Marine Corps' decision to switch from timed to lump-sum SRB payments was based on the fact that individuals prefer payments sooner rather than later. In short, Marines prefer their entire bonus at reenlistment, rather than distributed over the course of the enlistment. We measure this preference by the "personal discount rate." The personal discount rate answers the question: how much would my dollar have to be reduced today so that I am indifferent between receiving that reduced amount today and receiving a dollar one year from now? The reduction (in percentage terms) is the personal discount rate. Once we know a person's personal discount rate, we can use it to measure the discounted present value of any future payment.[25]

Personal discount rates differ from person to person. For example, some people are willing to pay for college through loans. Other potential students with identical qualifications may decide that "it just isn't worth the price" and accept full-time employment instead. For a sizable fee, H&R Block gives customers their tax refunds immediately—and gets many takers.

People with high discount rates put a high value on having money today and a lower value on having money tomorrow. They are less likely to go to college, save for retirement, or otherwise invest in their futures.

25. The discounted present value is the value today of a dollar to be received in the future.

## Estimates of personal discount rates

Two studies that estimate personal discount rates for enlisted servicemen using data from this period are Warner and Pleeter (2001) and Cylke et al. (1982).

Information on personal discount rates was revealed during the drawdown when military personnel offered separation pay were allowed to choose a timed payment plan or a smaller lump sum. Warner and Pleeter (2001) observe that before-tax break-even discount rates were between 18 and 20 percent on these separation bonuses. Relative takeup rates when military personnel were offered a choice suggest that nearly all enlisted personnel had discount rates at least this high. Rates were also high for officers, ranging from 0 to 30 percent and varying with individual characteristics.

Cylke et al. (1982) examine the differential impacts of lump-sum and installment bonuses to infer personal discount rates. They find discount rates of 15 to 18 percent for enlisted Navy personnel.

Most personal discount rate estimates, particularly those from recent studies, are large—between 6 and 40 percent. However, as Ross notes, estimated discount rates are not far from those found using data from businesses converting annuities into lump-sum payments.[26] In all cases, these personal discount rates are estimated to be higher than the official discount rate.[27] As such, paying bonuses as lump sums increases the efficiency of the SRB Program.

## Effect on reenlistment with installment SRBs

In the case of SRBs and reenlistment rates, different personal discount rates can result in two otherwise identical Marines making different reenlistment decisions. The higher the personal discount rate, the larger the overall bonus must be if some of the bonus payments

26. Ross (2000) cites *Wall Street Journal* reports that state that firms turning annuity payments into lump-sum payouts charged an effective interest rate of 21 percent.

27. By law, the Marine Corps discounts payments using the official government discount rate.

are put off into the future. Similarly, a smaller lump-sum than timed bonus is needed as long as a Marine's personal discount rate is positive.

Hansen and Wenger (2001) use a personal discount rate of 20 percent in their baseline model for Sailors, but they show how pay elasticity estimates are affected by alternative assumptions about this rate. They find that a one-level increase in the bonus multiple increases reenlistments by 0.9 percentage point if Sailors discount future payments at 10 percent, but 3.3 percentage points if Sailors discount future payments at 30 percent.[28]

## Effect on reenlistment with lump-sum SRBs

When an SRB is paid as a lump sum, its present discounted value is identical to the bonus—everything is received in the present, so there is no need to "discount" future payments. Lump-sum SRBs are more attractive than those paid in installments to all Marines, but they are most attractive to those who place the highest value on money now (i.e., those with the highest personal discount rate).[29]

If Marines have relatively high personal discount rates, the switch to lump-sum SRBs should have bigger effects on reenlistment rates than would be implied if they had relatively low personal discount rates.

Because the Marine Corps only switched to lump-sum SRBs in FY01, there is little research on the reenlistment effects of this change.[30] However, there have been similar changes in the past, including a shift to lump-sum SRBs in 1979 followed by a shift *away* 3 years later.[31] The changes provided a natural experiment that Goldberg and Warner (1982), Cylke et al. (1982), and Hosek and Peterson (1985)

28. These effects assumed the Navy SRB payment plan of 50 percent immediately and two timed payments of 25 percent.

29. See Cylke et al. (1982), Warner and Pleeter (2001), and Ross (2000).

30. Ross (2000) and Barry (2001) provide information on the change and theoretical discussions. Barry provides some early empirical work.

31. We are not certain whether the Marine Corps truly participated in the lump-sum SRB Program from 1979 to 1982.

use to estimate the effect of alternative payment plans on the reenlistment rate.

Goldberg and Warner (1982) estimate that a one-level increase in lump-sum SRBs will increase first-term reenlistment rates by 2 to 3.9 percentage points, and second-term reenlistment rates by 2.1 to 6.5 percentage points. Their estimates vary greatly by occupation group. The estimates of Cylke et al. imply that we should expect lump-sum payments to be a third again as effective as anniversary payments were.

Hosek and Peterson (1985) provide a single-point estimate across all occupation groups, but their estimate falls within the range determined by Goldberg and Warner. They find that a one-level increase in bonus levels will induce a 2.5-percentage-point increase in Zone A reenlistments if bonuses are paid as lump sums. Hansen and Wenger predict results that are similar in magnitude when discount rates are 20 percent or higher.

Although there are limits to the extent that other Service results can be applied to the Marine Corps, these estimates give us some sense of magnitudes resulting from the change back to lump-sum SRBs.

## The lump-sum program provides greater control over the SRB budget

One important benefit of the switch to lump-sum SRBs is *the increased control it gives the Marine Corps over SRB budgets when faced with unexpected (or expected) future congressional budget cuts.*[32]

As the biggest discretionary item in the MPMC account, the SRB budget is often targeted for reduction. In recent years, Congress and the GAO have increased their scrutiny of all the Services' SRB Programs and are demanding greater accountability. Although Congress has recognized the Marine Corps' SRB Program as the best-managed,

32. See Ross (2000) for a particularly good analysis of this point. We exclude transition costs because the transition from anniversary payments to lump-sum payments now has been successfully completed.

future congressional rule changes may be binding on all Services and future budget cuts may occur.[33]

Before the switch to lump sum, substantial portions of the Marine Corps' SRB budget were already committed in anniversary payments for those who had reenlisted in previous years. As such, a budget cut meant that the full decrease had to be absorbed by the current year's program. This effectively doubled the size of the "hit" and severely limited the Marine Corps' ability to influence reenlistment rates in the year of the cut. Now that the transition to lump-sum SRBs has been completed, none of the SRB budget is already committed for prior-year reenlistments.

To put this in context, if SRB payments include anniversary payments, an SRB budget cut of 20 percent cuts the number of possible new SRBs by about 40 percent, severely restricting the Marine Corps' ability to get the desired PMOS mix for first-term reenlisters.[34] If SRBs are given as lump sums, however, an SRB budget cut of 20 percent cuts the number of possible new SRBs by only 20 percent.

The importance of this distinction cannot be overemphasized. The Marine Corps uses a steady-state method for populating the career force. Each year, by PMOS, the First-Term Alignment Plan (FTAP) specifies how many first-term Marines will be allowed to reenlist. Although some allowances are made for current career force PMOS shortages or overages, the basic premise is that—each year—the Marine Corps will reenlist the *steady-state number of Marines required to maintain the required PMOS career endstrength.* By using a steady-state solution for determining the number of Marines permitted to enter the career force, the Marine Corps ensures that there are no "hills or valleys" in career force strength and that yearly promotion opportunities will not vary substantially.

---

33. Congress did not cut the Marine Corps' SRB budget in 2003, which may further indicate its faith in the program's management.

34. Under timed payments, about half of the SRB budget is allocated to anniversary payments, and only half is available for new SRB reenlistments.

# Cost-effectiveness of lump-sum bonus

## Official government calculations

As long as Marines' personal discount rates are greater than the Federal Government's discount rate, the Office of Management and Budget would deem lump-sum SRBs to be cost-effective.

Each year, the Federal Government sets a schedule of official discount rates that the public sector must use when preparing its budgets. The Marine Corps is required to use this rate for all planning that commits the Corps to future spending. There is often controversy about this rate—how well does it capture the Marine Corps' actual discount rate, and does it accurately represent the availability of future funds?[35]

The government discount rate this year is 3.25 percent (down from 6 percent the previous year). Because the government discount rate is calculated in real terms, the "official discount rate" budget planners would apply adds in the inflation rate, currently about 1.5 percent. Thus, the nominal Federal Government's discount rate is currently 4.75 percent, down from 7.5 percent the previous year.

We can be reasonably certain that we will estimate personal discount rates for Marines that are greater than 4.75 percent (or last year's 7.50 percent).[36]

## Is discounting even appropriate?

The Marine Corps is budgeted SRB money (and spends that money) each year. This is independent of whether SRBs are paid as lump-sum or anniversary payments.

Consider a situation in which one Service is budgeted $100 million annually for SRBs. This Service pays its SRBs as lump sums so that its

35. For the moment, we will leave that controversy aside.

36. We calculate discount rates for Marines in Zones A, B, and C in a later section.

yearly expenditures equal its yearly budget. Consider a sister Service that also is budgeted $100 million annually for SRBs, but that pays its SRBs as timed payments. The sister Service's yearly expenditures are also $100 million, but half the budgeted money comes from this year's budget and half comes from the three previous years' budgets (one-third from each year's budget).[37]

Are these situations really that different? We would argue that they are not. We contend that it is probably not appropriate to say that SRBs are costing the Service paying lump-sum bonuses more than the Service that is paying them as anniversary payments. Both Services, after all, are spending $100 million per year on bonuses.

Discounting is appropriate for costing out a transition from anniversary payments to lump-sums, but—once the lump-sum program is in place—we do not believe that discounting is appropriate. However, if discounting is deemed appropriate for bonus evaluation by OMB, the Marine Corps can be confident that OMB will bless the Marine Corps' lump-sum bonus program. As we show in a later section, the difference between the government discount rate and the individual Marine's discount rate is sufficiently large to make the Marine Corps lump-sum bonus program a very cost-effective one.

37. The current year's SRB budget will pay for the first installment for the new SRBs and then the anniversary payments for them in future years.

# Modeling considerations

We model the decision to reenlist or to separate from the Marine Corps. Because extensions today mean something very different than they did in earlier periods, we have chosen not to analyze extensions. Thus, we analyze only the final outcome: a Marine either reenlists or separates from the Marine Corps.

Some earlier studies examined extensions. In the past, Marines could extend their contracts, sometimes postponing the reenlistment decision for a year or two. Earlier research found that those who extended before reenlisting were more likely to reenlist.[38] Current Marine Corps policy, however, grants extensions only in very specific circumstances, and Marines granted such extensions are not expected or expecting to reenlist after the extension is complete.[39]

In describing earlier studies, we have referred to two approaches for modeling the effect of pay on reenlistment rates: the Annualized-Cost-of-Leaving (ACOL) Model or a Military/Civilian Pay Ratio Model. The main distinction between these two approaches is how they characterize the effect of military compensation on the reenlistment choice.

## The ACOL Model

Economic theory suggests that people will continue to serve in the military if the present discounted value of staying at least one more year

38. Quester and Adedeji (1991) find a positive effect on reenlistment from having previously extended. Goldberg and Warner (1982) find that the estimated increase in the reenlistment rate from increasing the bonus multiple is at the expense of would-be extenders. Their result is consistent with Sailors using extensions to "game" the system by affecting the year of the actual reenlistment.

39. Recently, the war in Iraq and stop-loss provisions have complicated this issue somewhat.

exceeds the present discounted value of their civilian alternatives, given their taste for the military and other characteristics.[40] The econometric approach that best approximates this is the Annualized-Cost-of-Leaving Model.[41]

In the ACOL Model, all aspects of compensation are collapsed into one variable (the ACOL variable). The underlying assumption is that a dollar of compensation has the same effect on behavior, regardless of its source.[42] Once computed, the ACOL variable is used in a regression model (usually a logistic) where the probability of reenlisting is a function of the ACOL variable and additional regressors that control for other characteristics, including one's taste for military life. Since the ACOL variable includes all aspects of compensation, its coefficient can be used to estimate the effect on reenlistment of changing housing allowances, basic pay, SRBs, or any other aspect of military compensation.

To construct an ACOL variable, one must:

- Estimate the expected value of military compensation,
- Estimate the expected value of civilian compensation,
- Convert all future payments into their value today (find their discounted present value) so that the two alternatives can be compared.

In a Navy study, Hansen and Wenger (2001) argue that the ACOL Model is the preferred empirical approach: many changes in the compensation scheme can be predicted using the same model and the estimates produced are robust to minor assumption or specification changes.

---

40. Actually, the benefit of staying versus leaving need not be positive for *all* possible career lengths, only for at least one period into the future.

41. The ACOL Model is well described in Hogan and Black (1991) and Goldberg (2001). Hansen and Wenger (2001) present a recent application of this model to Navy reenlistments.

42. The dollar could be part of expected civilian or military compensation.

## Drawbacks of the ACOL Model for this study

Using the ACOL Model for this analysis has four primary drawbacks.

First, it takes considerable effort to construct the ACOL pay variable. Detailed information on housing, dependent allowances, retirement compensation, and other components of military pay is needed, and assumptions about personal discount rates must be made.[43]

Second, estimating a Marine's civilian earnings presents its own set of challenges. The Current Population Survey (CPS) reports average earnings for those of similar ages and education levels, but would a given Marine earn the average? Would the Marine continue in his or her current occupation? Would training received in the military qualify the Marine for positions with above-average pay? Would the Marine be better off *not* pursuing the closest civilian equivalent to his or her current position?[44] Moreover, even if all quantities could be accurately estimated, they must be determined for many years into the future, introducing additional uncertainty. Because civilian alternatives are not clearly defined for many Marine Corps occupations, we could introduce additional error into the measurement of expected civilian earnings and, hence, the ACOL variable.[45]

Third, the ACOL Model assumes that each dollar of compensation—whether it is in bonus, basic pay, housing allowances, or anything else—has the same impact on behavior. For this study, we do not want to assume *a priori* that SRB dollars have the same retention impact as other forms of compensation.

43. See Goldberg (2001) for details.

44. For example, Marines with mechanical and technical training may have better-than-average civilian opportunities, whereas clerks and mess specialists might find a career change is their best civilian option.

45. Hansen (2000) explores the difficulties inherent in mapping Navy occupations to civilian counterparts and ends up mapping only some Navy occupations. Due to the nature of Marines' occupations, such a mapping likely would be less successful. An ACOL Model, however, does not need to map individual occupations; one can use the present discounted value of the average civilian and military income streams.

Perhaps the most important drawback is that we would not be able to map results from an ACOL Model to the easily predictable and updatable output we require for this study. Our study task is to estimate a model that can produce predicted reenlistment rates by occfield and bonus level annually. To do this in the ACOL framework, it would be necessary to repeat the entire analysis annually.

## The Military/Civilian Pay Ratio Model

Because of the limitations of the ACOL Model in this context, we use an approach that models civilian and military compensation with a set of regressors: an index of military to civilian pay, SRB variables, paygrade, and occfield—all measured at the time of the decision. This is the approach used in North (1994) and Quester and Adedeji (1991). Although this approach has less theoretical support in the literature, it has greater practical appeal because it is easily updatable without the effort and expense of a new empirical study.

Because we enter all compensation variables independently in this model, however, we need to consider possible problems in the estimation of the SRB's effects.[46]

### Estimating the SRB's effects: a caveat

Our empirical model rests on a theoretical relationship: all else equal, higher bonus rates induce higher reenlistment rates. Ideally, we would estimate reenlistment equations separately for each PMOS; then we would compare how reenlistment rates differed in the PMOS, everything else equal, when the bonus levels changed. However, this is not possible because most PMOS populations are too small to accurately estimate any effects. Moreover, many PMOSs have never paid bonuses. In short, historical data do not provide us with the information required for perfect estimation.

46. If this problem exists, it will not be apparent in the estimation of the ACOL model, since the present discounted values of all compensation variables are summed—making problems estimating SRB's effects difficult to discern.

Historical data are only rich enough for estimation by occfield. Even at the occfield level, many occfields are too small to permit accurate estimation, occfield by occfield, of the effects of different bonus levels. Thus, we estimate reenlistment probabilities for all reenlisters, controlling for occfield in the estimation.

Although such a strategy is the only one we can follow,[47] there is always the possibility that our data will not be rich enough to estimate the positive impact of an SRB. This is because some occfields with very high reenlistment rates will have small (or zero) SRBs; these are the popular occfields. Others may have low reenlistment rates—even with high bonus levels. These latter occfields would have had *even lower* reenlistment rates if they had lower SRB multiples, but unless we can observe the lower multiples (and their associated reenlistment rates) it will appear that high SRB levels are associated with low reenlistment rates. Similarly for the popular occfields, it will appear that low SRB levels are associated with high reenlistment rates. To overcome this problem, we use many years of reenlistment information for our estimates—hoping that we get sufficient bonus level variation within occfields to offset variation between occfields.

## Effects of past compensation changes: a particular problem for SRBs

Basic pay increases are built into the pay table. In contrast, bonuses can go up and down. One challenge that can affect the sign and significance of the SRB variable is the potential of SRBs to reduce subsequent term reenlistment rates unless payments are sustained.

SRBs are likely to induce some people to reenlist who might not have otherwise, and we can assume that these people probably have less "taste" for military life than those who would have reenlisted even without the bonus. Four years later, without continued inducement, we can expect a lower reenlistment rate from this group than from those who would have reenlisted without an SRB. Goldberg (2001) presents a good example of this by describing the effects of Zone A

47. This is also the strategy that other researchers follow.

bonuses on Zone B retention, and it is estimated empirically in Goldberg and Warner (1982). In this paper, they include a lagged first-term SRB multiple in the model for second-term reenlistments. Of the six occupational groups studied, they find an unexpected positive sign for one group, an expected negative sign for another group, and an insignificant effect of the lagged SRB variable in the other four groups.

Because Goldberg and Warner found little empirical support for this theoretical concern, we did not address the issue in this study. It is tedious to address empirically because one needs to identify and link bonuses offered at earlier reenlistment points to the current reenlistment decision. In addition, the Marine Corps uses SRBs less than the other Services, so this problem is likely to be less significant here.

# The model, dataset, and variables

## A basic model of the reenlistment decision

A Marine reenlists if he or she would be better off reenlisting than not reenlisting, after considering all features relevant to the reenlistment decision to the best of his or her ability.[48] These features include the relative financial compensation of staying or leaving, taste for military life, familial obligations, and anything else that may affect his or her decision.

Economists express "better off" using the concept of *expected utility*. Expected utility captures the idea that the Marine will include his or her expectations (or best guesses) about the future and the civilian labor force when making the decision—the Marine will reenlist if his or her net expected utility from reenlisting is positive.

We formalize this decision process using a latent variable model. We define $y^*$ to be the net utility from reenlisting and posit a linear relationship between $y^*$ and the features that may influence the Marine's decision. Although $y^*$ is unobservable, the *decision* that rests on $y^*$ is observable, and we call this decision $y$. If the Marine reenlists, we know that his or her personal $y^*$ was positive; we set $y$ equal to 1. If the Marine does not reenlist, we know that his or her personal $y^*$ was negative, and we set $y$ equal to 0.

In more formal language,

$$y^*_i = X_i\beta + \varepsilon_i$$

$$y_i = 1 \quad \text{if } y^*_i > 0$$
$$y_i = 0 \quad \text{if } y^*_i \leq 0 \quad .$$

48. We say "to the best of his or her ability" because the Marine cannot really know what his or her alternative wage would be if he or she were to leave, nor can the Marine perfectly predict future compensation in either sector.

In this framework, X includes anything we believe influences the net expected utility, and $\varepsilon$ is an error term that contains unobservable things that influence the Marine's decision. The contents of X are the variables we discuss later.

We can estimate the probability that y = 1 by noting that:

$$Prob(y_i = 1) = Prob(y_i^* > 0) = Prob(\varepsilon_i > -X_i\beta) = 1 - F(-X_i\beta) \quad .$$

If we make the appropriate assumptions about the distribution of the error terms across Marines in this sample, we can estimate this model using a logistic function.[49] In this case,

$$Prob(y_i = 1) = \frac{1}{1 + \exp(-\beta' x_i)} \quad .$$

This equation is estimated using maximum likelihood techniques. Because it is a nonlinear function, the derivatives depend on the point at which they are evaluated. Usually, we evaluate them at the mean of the data.

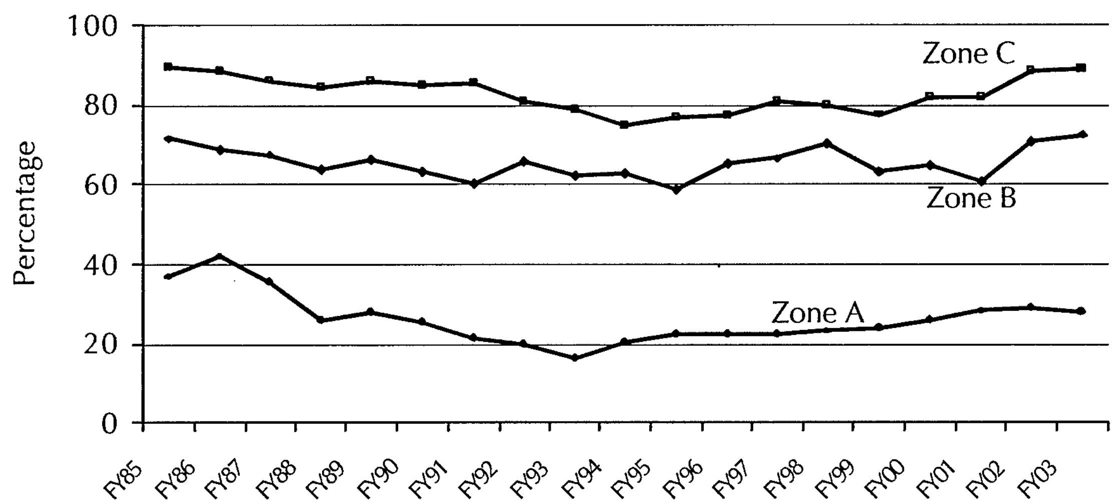
## Dataset

To estimate the model, we constructed a dataset that contained information about enlisted Marines and their reenlistment decisions. The main unit of observation in our study is a Marine's Zone A, B, or C reenlistment decision. Figure 8 reports reenlistment rates for Zones A, B, and C. A Marine may appear in the data multiple times, once at each reenlistment point that occurs between FY85 and the present.[50]

49. We assume that the error terms are distributed Type II extreme value. Other assumed distributions of the error term give other estimable equations; the most common alternative is probit, which results when we assume that the error terms are normally distributed. The two models produce very similar results. The logit's advantage is that computing the marginal effect is straightforward, whereas it is mathematically cumbersome when using a probit model. For further details about discrete outcome regression techniques, see Maddala (1983).

50. The three completed datasets are very similar to the dataset used in Quester and Adedeji (1991) and North (1994) (Zone A) and Quester and Lawler (1992) (Zone B). Within each zone, there can be only one reenlistment decision for each Marine.

Figure 8. Reenlistment percentages: Zones A, B, and C




For each reenlistment decision, we know characteristics of the Marine making the decision (e.g., PMOS, paygrade, race, number of dependents, AFQT score, and educational background), and features of the decision (the value of any bonus that would be received for staying, the unemployment rate for similarly aged civilian counterparts, etc.).

We have constructed the dataset from three information sources:

- Historical information on SRB offerings by PMOS
- Individual-level reenlistment and EAS separation information based on the ARSTAT and its modern equivalent
- Civilian earnings and unemployment rate data from the Bureau of Labor Statistics (BLS).

First, we created a chronological history of SRB multiples offered in each PMOS between FY80 and FY03. The SRB data are constructed from one of three sources, depending on the year in question. For FY80 to FY92, we use the historical SRB bonus multiple file compiled for earlier studies (Quester and Lawler (1992) for Zones B and C; North (1994) for Zone A multiples).[51] We use information from

51. Using Marine Corps Administrative Correspondence on the topic when available, we have checked these data for accuracy, and have created more detailed records regarding reenlistment policy in each year.

paper MARADMIN records for FY93 to FY96 and from electronic MARADMIN records for FY97 to FY03. Once linked to individual records, these data tell us the SRB multiple faced by any Marine who made a reenlistment decision *at any point in time* between FY80 and the present.[52] Our file records every change in multiple level over the period, be it due to new FY levels, temporary suspension of the program, or mid-year adjustment in response to updated planner estimates. Our SRB information starts in FY80, but our model uses only data from FY85 to FY03.[53]

Collecting this SRB data was time-consuming and tedious because most of it was not available electronically. The data span over 20 years of reenlistment decisions, and a given year may have included as many as five changes to the original SRB announcement. Copies of the ALMARS were often in very poor shape. Therefore, to expedite this process for future studies and to make data available to students at the Naval Postgraduate School, we plan to provide sponsors with an electronic copy of these SRB data and appropriate documentation on completion of this study.

The second source of information for our dataset is the ARSTAT records on reenlistment and the End of Active Service (EAS) separations.[54] Since 1990, the Marine Corps has put ARSTAT records into the Total Force Data Warehouse (TFDW) in an easy-to-use form. For reenlistment and EAS records in years before 1990, we use the quarterly ARSTAT files that CNA historically maintained.

The ARSTAT contains information about every Marine at the time of his or her decision, as well as characteristics about the actual decision. The unit of observation is an individual event in a Marine's career—

52. Previous studies included bonus data in the appendices; we will not. Instead, we will provide an electronic copy of the data to the sponsors.

53. Because we were collecting the data, we wanted to obtain as much historical data as possible. For estimation, however, we decided that reenlistment information from the early 1980s was really too dated to be useful.

54. A longitudinal dataset built from these records, the ARSTAT Tracking File, is well described in Steadman (1991). It provides a good description of the information in the ARSTAT records.

accession, extension, separation, reenlistment, grade change, or an unauthorized absence. Thus, each Marine appears multiple times. From these files, we extract reenlistment and EAS separation records. By using the TFDW version of the ARSTAT that is readily available to planners, we hope to increase the planners' ability to use our model and potentially to update the model more frequently and with greater ease.[55]

The third data source we use is the Bureau of Labor Statistics' Current Population Survey (CPS). The CPS supplies historical data on the American economy, including unemployment rates and average weekly earnings information for all years in our study. This information is used to construct the variables that we use to characterize the economic circumstances that Marines making their reenlistment decisions face.

In summary, we analyze reenlistment decisions made between FY85 and FY03, with separate analyses for Zones A, B, and C. The unit of observation is an individual Marine, and all Marines in the dataset must be recommended and eligible for reenlistment.

## Variables

Table 1 defines the independent variables we include in our reenlistment models. Previous research on reenlistment and the needs of Marine Corps planners guided our variable choices.

For each reenlistment decision, we have two variables that define the SRB: the SRB level offered (SRB multiple) and an indicator variable (lump-sum SRB) if the SRB multiple was in a lump-sum year.[56]

Each reenlist/leave observation in our dataset is assigned the SRB level present at the Marine's decision point. This level ranges between 0 and 5 for our sample period.

55. We will provide the extraction programs on the CD with our final report.

56. We experimented with entering the SRB variable as a set of dummy variables to allow a nonlinear relationship between SRB level and the reenlistment rate, but did not include this in our final specification.

Table 1. Explanatory variables and their definitions

| Explanatory variable | Variable definition |
|---|---|
| SRB multiple | SRB level for PMOS at decision point (0 to 5) |
| Lump-sum SRB | Value of 1 if SRB>0 and decision in FY00-FY03 |
| Military/civilian pay ratio | Ratio of indices (see text) |
| Unemployment rate | Male unemployment rate (see text) |
| Dependents or married | Value of 1 if Marine has dependents or is married, else 0 |
| Male | Value of 1 if Marine is male, else 0 |
| Black | Value of 1 if Marine is black, else 0 |
| Hispanic | Value of 1 if Marine is Hispanic, else 0 |
| AFQT ge 50 | Value of 1 if AFQT greater than or equal to 50, else 0 |
| AFQT ge 50 if SRB>0 | Value of 1 if SRB positive and AFQT greater than or equal to 50, else 0 |
| Relative rank | The Marine's relative rank (see text) |
| Drawdown 92-97 | Value of 1 if decision in FY92-FY97, else 0 |
| Occfield | A set of dummy variables representing occupational field |
| AFQT missing | Value of 1 if AFQT score is not available, else 0 |

From FY85 through FY03, the Marine Corps paid lump-sum SRBs for only 3 years (FY00 to the present). For those years, the SRB lump-sum variable has a value of 1 if the SRB offered to the Marine is positive (SRB level is 1 to 5). This variable can be seen as a shift parameter that measures the marginal effect of the larger payments.[57] Because of the nonlinear structure of the logistic function, this marginal effect will vary in magnitude with characteristics of the occfield. All else equal, theory suggests that take-up rates should be higher in lump-sum bonus years than in other years (because Marines' high personal discount rates make the lump sum worth more than timed payments).

The Military/Civilian Pay Index is constructed from (a) a series of military base pay increases based on pay tables and (b) a series of civilian pay increases (and, occasionally, decreases) based on BLS data. Estimates are based on civilian pay for full-time male workers age 18

57. This shift parameter will pick up not only the effect of lump-sum bonuses, but also the effect of anything common to reenlisters receiving SRBs in these years that is not common to the rest of the sample period.

to 24 for Zone A, and those age 25 to 34 for Zones B and C. Although military pay increases historically were the same for all zones, recent raises were targeted toward mid-career and senior enlisted Marines. As such, we allow the military indices to vary across zones based on pay increases due to a Marine of "average" rank for each zone. Our pay variable is an index normalized arbitrarily to 1 in 1990, not a dollar amount. This index (combined with additional controls) captures changes in relative pay between the military and civilian sectors and allows us to hold these factors constant as we focus on SRBs.

Figure 9 presents our Military/Civilian Pay Index for Zones A and B.[58] When the value of the index is greater than 1 (as it is currently), we know that relative pay is higher than it was in 1990. This does not mean that military pay is higher than civilian pay, only that the relationship between military and civilian pay is more favorable (to the military) than it was in 1990. This index clearly captures the main economic trends in compensation in this period. We can see the relatively poor pay of Servicemembers in the early days of the All-Volunteer Force and the resulting sharp pay increases under President Reagan. We see increases in relative military pay during each recession (shaded in gray) which reflect hard times in the civilian sector and the resulting pay decreases observed in this sector. We also see the divergence between the Zone A and Zone B indices in the mid-1990s. Throughout most of the extended 1990s boom, Zone A Marines fared relatively better than career force Marines. This reflects the fact that this economic boom disproportionately benefited older workers. The civilian counterparts of Zone A Marines did not see wage increases until the last years of the boom.

We also include a variable in our specification that controls for unemployment. Figure 10 shows the overall civilian unemployment rate since 1978.[59] It varies between 4 and 11 percent; the peaks and

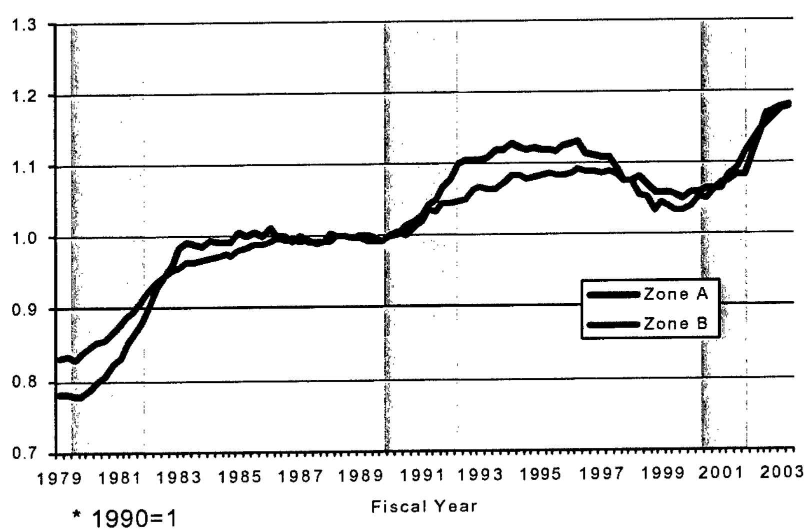
58. The Zone C index is almost identical to the Zone B index and, therefore, is not displayed.

59. Our dataset also includes the unemployment rate in the state of origin for each person in the sample. If Marines moved home after leaving the Corps, the state unemployment would be a better proxy of job availability than the national rate. Other researchers may want to explore this variable, but it is not useful for our prediction model that must by updated annually.

troughs of the business cycle are easily observed. Reenlistment rates rise when the civilian economy is sagging and fall when the civilian economy is booming.[60] To control for the business cycle's effects on reenlistments, we include the civilian unemployment rate at the time of the reenlistment decision in our regressions.[61] For all Marines, we use the rate for an appropriately aged cohort—that is, 20- to 24-year-old males in Zone A and 25- to 34-year-old males in Zones B and C (figure 11 shows the 20- to 24-year-old male unemployment rate).[62]

For each reenlistment decision, we also construct variables that reflect the Marine's characteristics at the time of decision.

Figure 9. The military/civilian pay index for Zones A and B




60. In fact, the recent rise in the unemployment rate is one reason that all Services' reenlistment rates are currently exceeding predictions. The job security a military contract offers matters more when jobs are in short supply.

61. We experimented with lagged unemployment rates, which capture the idea that people respond differently to trends than to levels, but found they added little to the model.

62. Even though 5 percent of the Marines in our sample are female, we use the male rate in all cases. Civilian opportunities for female Marines appear to more closely resemble those available to civilian men rather than civilian women because of Marines' training/experiences.

Figure 10. The civilian unemployment rate between 1978 and 2002

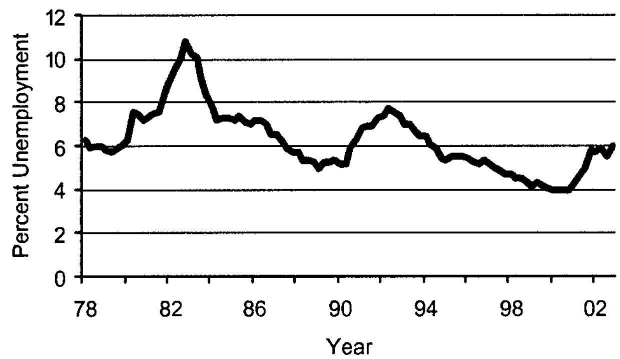
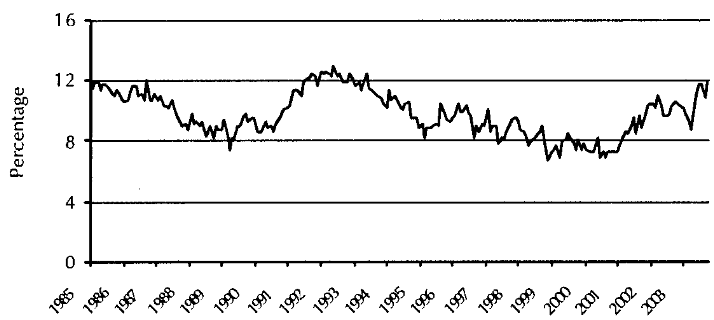



Figure 11. Unemployment rate for 20- to 24-year-old males 1985-2003




We include variables to control for gender and race/ethnic group. Research in the early 1990s has shown significantly higher reenlistment rates for blacks and Hispanics than for other Marines in all zones, and higher reenlistment rates for women in Zone A.[63]

We also include variables to control for family obligations. Married Marines and those with dependents reenlisted at far higher rates than others during the early 1990s. This result is expected, and is probably related to this population's greater need for a secure job and stable income.[64] Dependency rates rose for enlisted Marines at all ranks

63. Hispanics' success in the Marine Corps is the subject of another CNA research project this year.

64. Research on other Services and in the private sector finds the same result.

between 1983 and the mid-1990s, but recent evidence suggests that the marriage rate has declined slightly. It still, however, is well above the rate of enlisted Marines' civilian counterparts.[65]

Research indicates that ability, as measured by the AFQT score, has a large effect on reenlistment rates. Furthermore, Servicemembers' sensitivity to compensation increases can vary with AFQT score. Specifically, Marines with higher AFQT scores are less likely to reenlist but may be more sensitive to SRBs.[66] As such, we interact the SRB bonus level with AFQT to see if those with AFQT scores in the top half of the ability distribution react differently to positive SRB offers. We also add a variable to control for those with missing AFQT scores.

Previous research shows that those who have attained a higher rank at the time of the reenlistment decision are more likely to reenlist. Although part of this effect is due to higher earnings in higher ranks, part also is due to the correlation between higher promotion rates and success in the military. "Fast track" Marines either have a greater aptitude for the military (hence they excel more than their basic characteristics would predict) or a greater taste for military life (people usually excel at things they enjoy).

However, the rank distribution of Marines at each reenlistment zone has changed over our sample period.[67] For this reason, we create a relative rank variable. The variable is defined as the Marine's rank divided by the average rank of those with the same years of service in the year of the decision. This allows us to remove the effects of the changing rank distribution over time. Furthermore, it allows us to control for relative positions in the pay table.

65. See Quester and Adedeji (1991), Quester (1998), and Lee and Quester (2000).

66. See Goldberg (2001) and Quester and Adedeji (1991). It was assumed that Marines with missing AFQT scores were not in the upper half of the distribution.

67. This is due to the effect of the drawdown on promotion opportunities as well as changes in average contract length over this period. See Quester and Lawler (1994) for a summary of these changes.

We also include a variable to control for the effect of the military drawdown that occurred between FY92 and FY97. We expect that, all else equal, reenlistment rates will be lower in these years.

Finally, we include information on each Marine's occfield to capture differences in civilian alternatives and opportunities and job conditions. This variable also allows us to predict reenlistment rates by occfield and SRB level.

# Empirical results

## The regression model

For each zone, we estimate two reenlistment models using a logit specification in which the dependent variable is the reenlistment decision and the independent variables are those listed in table 1. The first specification controls for occupational field; the second specification omits the variables describing occupational field. Both specifications allow us to isolate the effect of increasing the SRB multiple *net* of any effects associated with relative rank, relative pay, or personal characteristics. The first specification is the one that we use to establish predicted reenlistments by occupational field and SRB level, and it is the specification described in the text. Because Marines sort themselves by occupation, however, it is interesting to see if there are significant differences in the statistical significance of variables in the two specifications.

### Zone A model

Table 2 reports coefficients and significance levels for the key variables in the Zone A model that also controls for occfield. Appendix A reports the full set of regression results.

As table 2 shows, the coefficient on the SRB multiple variable is positive and highly significant. We find that, all else constant, a one-level increase in the SRB level in Zone A results in a 6.6-percentage-point increase in the reenlistment rate.

The effect of the lump-sum variable on the reenlistment rate is positive and significant, meaning that—as expected—lump-sum SRBs have a positive effect on reenlistment rates. In fact, we find that lump-sum SRBs in Zone A result in substantially higher reenlistment rates—rates that are 10.7 percentage points higher than those resulting from installment-paid SRBs. Our estimate indicates that the impact of shifting from anniversary payments to lump-sum payments had a *larger* impact on reenlistments than a one-level increase in the SRB multiple (10.7 versus 6.6 percentage points). Our estimated Zone A lump-sum impact is really too large and is probably picking up more than the impact of the lump sum.

Table 2. Logistic regression estimates for Zone A reenlistment decisions: FY85-03[a]

| Variable | Co-efficient | t-statistic | 95% confidence interval | | Marginal effect[b] |
|---|---|---|---|---|---|
| SRB multiple | 0.342 | 74.24 | 0.333 | 0.351 | 0.066 |
| Lump-sum SRB | 0.554 | 30.54 | 0.519 | 0.590 | 0.107 |
| Mil to civ pay ratio | 0.219 | 2.25 | 0.028 | 0.410 | 0.000 |
| Unemp rate 20-24 males | 1.603 | 5.66 | 1.408 | 2.157 | 0.003 |
| *Male* | *0.023* | *1.32* | *-0.011* | *0.058* | *0.005* |
| Black | 0.830 | 74.74 | 0.808 | 0.852 | 0.161 |
| Hispanic | 0.180 | 13.08 | 0.153 | 0.207 | 0.035 |
| AFQT ge 50[c] | -0.070 | -6.39 | -0.091 | -0.048 | -0.014 |
| AFQT ge 50 if SRB>0 | 0.114 | 7.50 | 0.084 | 0.1447 | 0.022 |
| Dependents or married | 0.691 | 84.25 | 0.675 | 0.707 | 0.134 |
| Relative rank | 2.775 | 87.22 | 2.712 | 2.837 | 0.010[d] |
| Drawdown 92-97 | -0.183 | -15.56 | -0.207 | -0.160 | -0.036 |
| Constant | -5.486 | -48.02 | -5.710 | -5.262 | |
| | | | | | |
| Average reenlistment rate | .263 | | | | |
| No. of observations | 365,975 | | | | |
| Chi square | 50,183 | | | | |

a. Variables that are not statistically significant at the 1-percent level are in italics.
b. Marginal effects are calculated at the mean of the data. See text for interpretation.
c. In the regression, we also control for occfields and the 2.3 percent of the sample with missing AFQT scores. See tables 15 and 16 (in appendix A) for the full regression and the regression that omits occfield, respectively.
d. This marginal effect is for an increase in relative rank of one standard deviation.

The coefficients on both the military-to-civilian pay ratio and the unemployment rate are significant in the Zone A regression, but the marginal effects are very small. For example, a 1-percentage-point increase in the 20- to 24-year-old male unemployment rate increases the reenlistment rate by only 0.3 percentage point. A 1-percentage-point increase in the military-to-civilian pay ratio increases the reenlistment rate by .04 percentage point.

The gender coefficient in our regression is positive, but not significant, at the 1-percent level.[68] The race/ethnic variables in our regression both are significant and have the expected signs. They indicate that blacks have reenlistment rates that are 16.1 percentage points higher than non-blacks—a large relative effect; Hispanics have rates that are 3.5 percent higher than non-Hispanics.

In this specification, the coefficient on the AFQT ge 50 variable is negative and significant.[69] However, our SRB interaction term is positive and also is significant, indicating that those with higher AFQT scores are indeed more sensitive to SRBs. To measure the full effect of higher AFQT scores on reenlistment rates for Marines offered the SRB, we must add the effect of the interaction term (AFQT ge 50 if SRB > 0) to the effect for the AFQT ge 50 variable. The difference in reenlistment rates between those with higher and lower AFQT scores when an SRB is positive is:

$= -.014 + .022 = .008.$

This means that, all else constant, those with high AFQT scores who are offered SRBs have reenlistment rates that are 0.8 percentage point higher than those Marines offered SRBs who do not have high scores. This difference may seem small, but it is another positive effect that SRBs have in determining the population of reenlisters.[70]

68. In the specification that omits occfield (table 16 in appendix A), the gender variable is negative and significant (women have higher Zone A reenlistment rates than men). This relationship also persists in simple tabulations of reenlistment rates by gender. Why is this? The answer is that women are not randomly distributed across occupations; female Marines are concentrated in occupations with higher than average reenlistment rates. In regressions that control for occfield, as in table 2, the higher female retention rates will show up in the occupation, not the gender, coefficient.

69. In the specification that omits occfield, however, the AFQT variable is insignificant, suggesting that higher scoring Marines are not randomly distributed across occupations. It suggests, in fact, that Marines with high AFQT scores are more likely to be found in occupations with lower than average reenlistment rates. It also suggests that the AFQT scores of reenlisters and separaters are probably similar.

70. The variables are jointly significant at the 1-percent level.

Table 3 shows the joint marginal effects of SRBs and AFQT scores for all categories of reenlisters.

Table 3. Marginal effect on reenlistment rates: AFQT scores and SRBs

| | SRB = 0 | Anniversary payments (SRB > 0) | Lump sum (SRB > 0) |
|---|---|---|---|
| AFQT < 50 | base case | .066 | .173[a] |
| AFQT >= 50 | -0.14 | .074[b] | .181[c] |

a. .066 + .107 = .173.
b. -014 + .066 + .022 = .074.
c. -.014 + .066 + .107 + .022 = .181.

The coefficient on the dependents or married variable is positive, large, and highly significant. As theorized, married Marines or those with dependents have much higher reenlistment rates (13.4 percentage points) than those who are not married and have no dependents.

We also examine the effect of relative rank on the reenlistment rate. We estimate that being one standard deviation above the average rank in Zone A increases the reenlistment rate by 1.0 percentage point. Since we are controlling in the regressions for occupational field, the variation in relative rank comes from promotion speed within the occfield, not from comparisons of fast-track occfields and occfields with slower promotion rates. Our relative rank variable measures the relative rank of Marines in the reenlistment population each year. In 2003, the average rank for Zone A Marines was 4.2 (two-tenths of the way from E-4 to E-5). Zone A Marines with a rank of one standard deviation above the average had a rank of 4.8 (eight-tenths of the way from E-4 to E-5). Thus, reenlisters in 2003 who had rank of "4.8" were 1 percentage point more likely to reenlist than those whose rank was average ("4.2").

Finally, the drawdown coefficient in our Zone A model is negative and significant. Evaluating the derivative at the variable mean suggests that, holding all else constant, reenlistment rates were 3.6 percentage points lower in FY92–97 than in other years.

## Zone B model

Table 4 reports coefficients and significance levels for the key variables in the Zone B model.[71] All coefficient signs are the same as those reported in the Zone A model.

Table 4. Logistic regression estimates for Zone B reenlistment decisions: FY85-03[a]

| Variable | Coefficient | t-statistic | 95% confidence interval | | Marginal effect[b] |
|---|---|---|---|---|---|
| SRB multiple | 0.318 | 33.17 | 0.299 | 0.337 | .072 |
| Lump-sum SRB | 0.274 | 4.70 | 0.160 | 0.388 | .062 |
| Mil to civ pay ratio | 2.148 | 12.88 | 1.821 | 2.475 | .005 |
| Unemp rate 25-34 male | 2.698 | 4.11 | 1.411 | 3.984 | .006 |
| Male | 0.209 | 6.59 | 0.147 | 0.272 | .047 |
| Black | 0.585 | 30.37 | 0.547 | 0.622 | .132 |
| Hispanic | 0.237 | 8.66 | 0.183 | 0.290 | .053 |
| AFQT ge 50[c] | -0.240 | -12.58 | -0.277 | -0.202 | -.054 |
| Dependents or married | 0.525 | 29.74 | 0.490 | 0.560 | .118 |
| Drawdown 92-97 | -0.097 | -5.18 | -0.134 | -0.060 | -.022 |
| Relative rank | 7.074 | 76.62 | 6.893 | 7.255 | .015[d] |
| Constant | -9.593 | -45.06 | -10.010 | -9.175 | |
| | | | | | |
| Average reenlistment rate | 0.658 | | | | |
| Number of observations | 94,303 | | | | |
| Chi square | 12,232 | | | | |

a. Variables that are not statistically significant at the 1-percent level are shown in italics.
b. Marginal effects are calculated at the mean of the data. See text for interpretation.
c. In the regression, we also control for occfields and for the 17.9 percent of the sample with missing AFQT scores. Table 17 contains the full specification; table 18 reports the results of the logistic regression without the occupational variables (see appendix B).
d. This marginal effect is for an increase in relative rank of one standard deviation.

71. The specification is virtually the same as in Zone A, except that the additional AFQT term (AFQT ge 50 and SRB>0) is dropped. This is because a large number of AFQT scores are reported as "missing" in Zones B and C. Appendix B contains the full set of Zone B regressions.

We a find strong SRB multiple effects for Zone B—a one-level increase in the SRB multiple results in a 7.2-percentage-point increase in the Zone B reenlistment rate. The lump-sum variable is positive and significant. Lump-sum SRBs result in Zone B reenlistment rates that are 6.2 percentage points higher than those resulting from installment-paid SRBs. For Zone B Marines, lump-sum bonuses are worth about the same as a one-level increase in the SRB multiple. Given the cost of a one-level increase in the multiple, lump-sum payments look very cost-effective.

The coefficients on both the military-to-civilian pay ratio and the unemployment rate are positive and significant, but their relative effects on the Zone B reenlistment rate remain below 1 percentage point.

The gender coefficient in the regression becomes significant in Zone B, suggesting that men have reenlistment rates that are 4.7 percentage points higher than women.[72] The race/ethnic variables indicate that the effect of race is slightly lower in Zone B than in Zone A, whereas the effect of ethnicity is slightly higher. We find that blacks have Zone B reenlistment rates that are 13.2 percentage points higher than others, and Hispanics have rates that are 5.3 percent higher than non-Hispanics.

The coefficient on the AFQT ge 50 variable is negative and significant, which means that, all else constant, those with high AFQT scores have Zone B reenlistment rates that are 5.4 percentage points lower than those who do not have high scores.

As in Zone A, the coefficient on the dependents or married variable is positive and significant. We find that married Marines or those with

72. In appendix B, the gender variable is insignificant in the regressions that omit occfield, suggesting that there is no overall gender difference in reenlistment rates in Zone B. However, female Marines are heavily represented in occfields with high reenlistment rates. The regression results in table 4 that hold constant the effect of occfield suggest that, if female Marines were distributed in the same way that male Marines are among the occfields, their reenlistment rates would be lower than those for male Marines.

dependents have Zone B reenlistment rates that are 11.8 percentage points higher than those who are not married and do not have dependents. This increase in the reenlistment rate for married Marines or Marines with dependents, however, is almost as large as the impact of a level 1 SRB in the lump-sum years (.072 + .062 = .134).

Increasing the relative rank variable by one standard deviation increases the Zone B reenlistment rate by 1.5 percentage points. In 2003, about 40 percent of Marines making Zone B reenlistment decisions were E-6s and 60 percent were E-5s. The average rank for Zone B Marines was 5.4; an increase of one standard deviation made the average rank 5.9 (almost an E-6).

Recall that these results are partial derivatives (all other variables held constant). Some independent variables are independent of other variables, whereas others are likely to be correlated with each other. For example, those whose rank is one standard deviation above their length-of-service peers are more likely to have better than average AFQT scores. In short, caution should be observed in interpreting partial derivatives for independent variables that may be correlated with other independent variables in the regression.

The drawdown coefficient is negative and significant, although slightly smaller than in Zone A. Evaluating the derivative at the variable mean suggests that, holding all else constant, Zone B reenlistment rates were 2.2 percentage points lower in FY92–97 than in other years.

## Zone C model

Table 5 reports coefficients and significance levels for the key variables in the Zone C model.[73] All coefficient signs are the same as those reported in the Zone A and B models.

In Zone C, we find the smallest SRB effect of the three models—a one-level increase in the SRB multiple results in a 3.5-percentage-point increase in the reenlistment rate. Furthermore, the lump-sum variable is small and insignificant in Zone C. These diminished SRB effects may be due in part to the already very high average reenlistment rates in

73. The full regression results are in appendix C.

Zone C and the greater relative importance of retirement pay for Marines with 10 to 14 years of service. In addition, however, there have been few Zone C SRBs given in lump-sum years. We suspect that in the future, when the model is reestimated with more observations on Zone C lump-sum SRB payments, the lump-sum variable will become statistically significant.

Table 5. Logistic regressions estimates for Zone C reenlistment decisions: FY85-03[a]

| Variable | Coefficient | t-statistic | 95% confidence iInterval | | Marginal effect[b] |
|---|---|---|---|---|---|
| SRB multiple | 0.244 | 7.95 | 0.184 | 0.304 | .035 |
| *Lump-sum SRB* | *0.153* | *1.13* | *-0.112* | *0.417* | *.022* |
| Mil to civ pay ratio | 2.361 | 6.31 | 1.628 | 3.094 | .003 |
| Unemp rate 25-34 males | 13.209 | 11.41 | 10.939 | 15.478 | .019 |
| Male | 0.371 | 6.30 | 0.256 | 0.487 | .054 |
| Black | 0.229 | 7.28 | 0.167 | 0.291 | .033 |
| Hispanic | 0.234 | 4.66 | 0.136 | 0.333 | .034 |
| AFQT ge 50[c] | -0.176 | -4.86 | -0.248 | -0.105 | -.026 |
| Dependents or married | 0.355 | 8.91 | 0.277 | 0.433 | .051 |
| Drawdown 92-97 | -0.544 | -16.65 | -0.608 | -0.480 | -.079 |
| Relative rank | 16.147 | 85.87 | 15.779 | 16.516 | 0.016[d] |
| Constant | -17.547 | -38.09 | -18.449 | -16.644 | |
| | | | | | |
| Average reenlistment rate | 0.824 | | | | |
| Number of observations | 54,334 | | | | |
| Chi square | 11,030 | | | | |

a. Variables that are not statistically significant at the 1-percent level are shown in italics.
b. Marginal effects are calculated at the mean of the data. See text for interpretation.
c. In the regression, we also control for occfields and for the 20.6 percent of the sample with missing AFQT scores. Table 19 (full regression results) and table 20 (regression results without occfield) are found in appendix C.
d. This marginal effect is for an increase in relative rank of one standard deviation.

The coefficient on the military-to-civilian pay ratio is positive and significant in Zone C, although its effect on the reenlistment rate remains very small. The unemployment rate coefficient is positive and significant in Zone C, and it has a slightly larger effect on reenlistment rates than in Zone B. We find that a 1-percent increase in the

25- to 34-year-old male unemployment rate increases the Zone C reenlistment rate by 1.9 percentage points.

The gender coefficient in the Zone C regression suggests that men have reenlistment rates that are 5.4 percentage points higher than women. Although Zone A and B results also showed men having higher reenlistment rates than women, the appendix regressions that omit occfield showed different results. In Zone C, however, both regressions—with or without occupation controls—show men having higher reenlistment rates than women.

The race/ethnic variables indicate that the effects of race and ethnicity are smaller in Zone C.[74] We find that blacks have reenlistment rates that are 3.3 percentage points higher than others, and Hispanics have rates that are 3.4 percent higher than non-Hispanics.

The coefficient on the AFQT ge 50 variable is negative and significant, indicating that those with high AFQT scores have reenlistment rates that are 2.6 percentage points lower than those who do not have high scores in Zone C.

As in the other zones, the coefficient on the dependents or married variable is positive and significant, although the effect on reenlistment rates is smaller in Zone C than in Zones A and B. We find that married Marines or those with dependents have Zone C reenlistment rates that are 5.1 percentage points higher than those who are not married and do not have dependents.

The effect of relative rank on the Zone C reenlistment rates is again statistically significant. In 2003, the average rank of Zone C reenlisters was 6.1; an increase of one standard deviation makes rank 6.6. Such an increase in the relative rank variable increases the Zone C reenlistment rate by 1.6 percentage points, all else constant. And, since we are holding occfield constant, the variation in relative rank comes from promotion speed within the occfield, not from comparisons of fast-track occfields with ones with slower promotion rates.

74. The average reenlistment rate in Zone C, however, is so high that it would be difficult to have effects as large as in Zone A.

Finally, the drawdown coefficient in the Zone C regression is significant and its effect is larger than in the other zones. Evaluating the derivative at the variable mean suggests that Zone C reenlistment rates were 7.2 percentage points lower in FY92–97 than in other years, suggesting that Marines' reenlisting with 10-14 years of service were more sensitive to the drawdown than those reenlisting with fewer years of service.

Taken together, the regression results suggest that SRBs significantly raise reenlistment rates in all three zones. For each increase in the SRB level, the reenlistment effect was 6.6 percentage points in Zone A, 7.2 percentage points in Zone B, and 3.5 percentage points in Zone C. Furthermore, the switch to lump-sum SRBs had dramatic effects on reenlistment rates: 10.7 percent in Zone A and 6.2 percent in Zone B. The results for the lump-sum SRB in Zone C are not statistically significant, but that may be because we have so few Zone C SRBs in the lump-sum years.

In all three models, the effects of the military-to-civilian pay ratio and the unemployment rate on reenlistment rates are significant, but quite small. The Hispanic variable's effect on reenlistment rates is between 3 and 5 percentage points in all zones, whereas the black variable's effect ranges from 16 percent (in Zone A) to 3 percent (in Zone C).

In all zones, single Marines reenlist at significantly lower rates than do Marines who are married or have dependents. Although the effect varies by zone and is most important in Zones A and B, it is at least as large as having a level-one SRB in all zones.

Finally, relative rank and the drawdown variables are statistically significant predictors of reenlistments in all zones.

## Findings: Personal discount rates for Marines

For each reenlistment zone, we estimated both the impact of the different SRB multiples and the lump-sum SRB on Marines' reenlistment decisions. From these estimates, we can derive Marines' implied personal discount rates in each zone. If the implied personal discount rate is larger than the government's official discount rate (currently 4.75 percent), the Marine Corps' decision to pay bonuses as lump sums is validated.

Remember that the lump sum's estimated effect in Zone A was *very* large, causing lump-sum decision-makers to reenlist 10.7 percentage points over the reenlistment rates estimated for those offered anniversary payments. It is not surprising that the implied discount rate for Zone A Marines is also very large—154.6 percent.[75]

Later in this paper, we recommend that the models be reestimated after the FY06 decisions are finalized. We urge reestimation in part because the lump-sum effect we estimate in Zone A seems too large. Our dataset includes lump-sum bonus payments in FY01 to FY03. These post-9/11 years included the onset of Career Retention Specialists,[76] wars in Afganistan and Iraq, stop-loss orders, and poor job prospects. Unfortunately, the lump-sum variable in the logistic regressions is probably picking up "more" than the lump sum as all these events happened in the same time period. In order to better estimate the personal discount rates of Zone A Marines, we believe the regressions must be reestimated in a few years when there have been more lump-sum reenlistment decisions. We are quite confident, however, that the personal discount rate of Zone A Marines exceeds the government's official discount rate of 4.75 percent!

Personal discount rates estimated for Zone B and C Marines seem more reasonable—18.5 percent for Zone B Marines and 14.3 percent for Zone C Marines, both considerably larger than the Federal Government's official discount rate. Because the lump-sum variable was not statistically significant in the Zone C regressions, however, less confidence can be placed in the discount rate for Zone C Marines. Again, after more years of lump-sum bonuses, this discount rate can be estimated more reliably.

75. A discount rate of 150 percent means that a Marine would be indifferent between $1 today and $3 a year from today.

76. This PMOS recently was created because of fears that FTAP boatspaces might not be filled.

# Findings: Cost-effectiveness of lump-sum bonuses

In this section, we estimate how much the Marine Corps saved in FY03 by offering lump-sum bonuses.

## Zone A

We used the SRB planner's Zone A spreadsheet and predicted FY03 reenlistment rates by occfield and bonus level in two scenarios:

- Under lump-sum SRB payments [77]
- Under anniversary SRB payments.

If either prediction produced more reenlistments than the number of FTAP boatspaces, we used the FTAP boatspaces as the number of reenlistments.[78] The SRB costs of reenlistments predicted with the lump sum were $26.6 million, essentially what was spent on Zone A bonuses in FY03.

We then looked at what these reenlistments would have cost if the Marine Corps still paid its bonuses in anniversary payments. With anniversary payments, 32 of the 161 PMOSs would have been short reenlistments. We calculated bounds as to what it would cost to obtain these reenlistments under timed payments. As expected, given the magnitude of the lump-sum payment method on reenlistments, the cost of obtaining these reenlistments with anniversary payments is large. To get almost the same number of reenlistments in each of the PMOSs would cost $34.6 million; to get all of the reenlistments would have cost $43.7 million.[79]

---

77. The lump-sum variable has a value of 1 in the predictions for lump-sum bonuses and a value of 0 in the predictions for anniversary payment bonuses.

78. As previously discussed, the number of PMOS boatspaces limits Zone A reenlistments.

79. The lower bound chooses the largest multiple with the reenlistment rate less than the reenlistment rate under lump sum. The upper bound uses the smallest multiple that yields a reenlistment rate greater than or equal to the reenlistment rate obtained from lump-sum SRBs.

In summary, our estimates indicate that it would have cost the Marine Corps at least $8 million more—or 30 percent of the Zone A SRB budget—to have obtained the same number of Zone A reenlistments under anniversary payments as it obtained under the lump-sum payment plan.

## Zones B and C

Because the SRB lump-sum variable was not statistically significant in the Zone C regressions, we estimate the savings from shifting to lump-sum payments only for Zone B. We use the same strategy in Zone B as in Zone A, except that there is no FY03 EAS population from which to calculate predicted reenlistments in Zone B. This is because career force Marines in both Zones B and C can reenlist at any time up to one year from their EAS. For the population, we took the actual number of Zone B Marines who either left or reenlisted in FY03.[80]

With lump sum, the Zone B SRB cost was $14.4 million. There were 56 (out of 271 PMOSs) that would have had fewer reenlistments under an anniversary payment scheme. The cost to obtain the reenlistments with anniversary payments would have been $24.8 to $40.1 million (lower and upper bound, respectively). As in Zone A, the savings derived from lump-sum payment of the bonuses is substantial.

80. Alternatively, we could have used all who had to reenlist in FY03 and half of those who could reenlist in either FY03 or FY04.

# The prediction model

To efficiently administer the Selective Reenlistment Bonus Program, Marine Corps planners must set SRB multiples based on their best estimates of likely reenlistment rates, the likely effect of SRBs to induce additional reenlistments, and budget constraints. This task is made even more difficult by restrictions on the planner's ability to influence rates once the year has begun.[81] To assist in this effort, CNA provides the Marine Corps with a spreadsheet based on the model described in North (1994). The Marine Corps has used the spreadsheet, which reports expected reenlistment rates by occfield for each bonus multiple, to set Zone A SRBs for the last decade.

Each spring, CNA uses the model to forecast reenlistment responses by occfield to SRBs from level 0 (no SRB) to level 5.[82] To do so, CNA forecasts the male unemployment rate for an appropriately aged cohort and the military-to-civilian pay ratio.[83] Once these variables have been forecasted and inserted into the model, the strength planner can use the resulting table to set Zone A SRB levels by PMOS.

Periodically, the complete analysis must be reestimated using more recent data. The regression results in the previous section update the work of North (1994), Quester and Adedeji (1991), and Cymrot (1987).

81. In a given year, these restrictions are a function of current policy and/or regulation. Restrictions attempt to keep Marines from "gaming" the system by timing their reenlistments to maximize the bonus received.

82. The Marine Corps planner assigns bonuses by PMOS, but models in this and all other studies described herein predict bonus levels by occfield (or an equivalent characterization). This is because most PMOSs are quite small—too small, in fact, for reliable statistical analyses.

83. In earlier years, CNA also forecast the proportion of 6-year initial enlistment contracts in the EAS population and the proportion of second enlistments in the EAS population. In recent years, however, these variables are essentially zero and have not been part of the forecast.

Using the updated regression model, we create a new table of Zone A predicted reenlistment rates by occfield and SRB level (see table 6).[84] This table substitutes FY03 average values of the military-to-civilian pay ratio and the unemployment rate for 20- to 24-year-old men for the forecasted values that would be needed to set SRB levels for an upcoming year.[85]

With these predicted reenlistment rates by occfield and SRB level, we can now turn to the SRB planner's assignment of SRB multiples.

## Assignment of bonus levels

Each year, the SRB planner must specify the Zone A bonus levels for the next fiscal year. This is a complicated and difficult task—involving many inputs and multiple considerations.

The assignment task is complicated by the Marine Corps' desire to prevent gaming by producing a list of Zone A SRB multiples at the start of the fiscal year.[86] Planners do not want Marines to expect that SRBs will be raised during the year, but instead that bonus levels will be highest at the start of the fiscal year. If the boatspaces fill and additional reenlistments in the PMOS are no longer required, the SRB will become moot and the PMOS will close (no further reenlistments will be allowed). Thus, the process encourages Zone A Marines who can reenlist at any point in the fiscal year to reenlist early in the fiscal year.

84. Appendix D explores how the population we use for our estimation may differ from the EAS population the SRB planner estimates for Zone A in the June preceding the fiscal year of execution. See tables 21 and 22 in appendix E for Zone B and C reenlistment predictions.

85. With the unemployment rate and military to civilian pay ratio, predicted reenlistment percentages are found for each occfield and SRB level. This is done by using the mean values of the male, black, Hispanic, AFTQT ge 50, dependents or married, and relative rank variables. The constant is set to one, the drawdown variable is set to zero, and SRB lump sum variable is set to one for SRB multiples greater than zero.

86. If Marines think that the SRB multiple will go up, some will wait to reenlist. Gaming was a big problem before the Marine Corps instituted this policy.

Table 6. Zone A predicted reenlistment percentages for FY03[a]

| Occfield | SRB multiple 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 01 | 36.0 | 58.0 | 66.0 | 73.2 | 79.4 | 84.4 |
| 02 | 25.4 | 45.5 | 54.1 | 62.4 | 70.0 | 76.7 |
| 03 | 14.3 | 28.9 | 36.5 | 44.7 | 53.2 | 61.6 |
| 04 | 24.5 | 44.3 | 52.8 | 61.2 | 69.0 | 75.8 |
| 05 | 22.1 | 41.1 | 49.5 | 58.0 | 66.1 | 73.3 |
| 06 | 19.6 | 37.4 | 45.7 | 54.3 | 62.6 | 70.2 |
| 08 | 17.1 | 33.6 | 41.6 | 50.1 | 58.6 | 66.6 |
| 11 | 21.3 | 39.9 | 48.4 | 56.9 | 65.0 | 72.3 |
| 13 | 21.8 | 40.5 | 49.0 | 57.5 | 65.6 | 72.8 |
| 18 | 16.4 | 32.5 | 40.4 | 48.9 | 57.4 | 65.5 |
| 21 | 20.4 | 38.6 | 46.9 | 55.4 | 63.7 | 71.2 |
| 23 | 21.2 | 39.8 | 48.2 | 56.7 | 64.8 | 72.2 |
| 26 | 17.2 | 33.7 | 41.7 | 50.2 | 58.7 | 66.7 |
| 28 | 15.5 | 31.0 | 38.8 | 47.1 | 55.7 | 63.9 |
| 30 | 30.9 | 52.3 | 60.7 | 68.5 | 75.4 | 81.2 |
| 31 | 32.3 | 53.9 | 62.2 | 69.9 | 76.6 | 82.2 |
| 33 | 23.5 | 43.0 | 51.5 | 59.9 | 67.8 | 74.8 |
| 34 | 33.5 | 55.2 | 63.5 | 71.0 | 77.5 | 82.9 |
| 35 | 21.4 | 40.0 | 48.4 | 56.9 | 65.1 | 72.4 |
| 41 | 68.8 | 84.4 | 88.4 | 91.5 | 93.8 | 95.5 |
| 43 | 23.3 | 42.6 | 51.1 | 59.6 | 67.5 | 74.5 |
| 44 | 37.1 | 59.1 | 67.1 | 74.1 | 80.1 | 85.0 |
| 46 | 29.8 | 51.0 | 59.4 | 67.3 | 74.4 | 80.3 |
| 55 | 32.9 | 54.6 | 62.9 | 70.5 | 77.1 | 82.6 |
| 57 | 26.0 | 46.3 | 54.9 | 63.1 | 70.7 | 77.2 |
| 58 | 19.9 | 37.8 | 46.2 | 54.7 | 63.0 | 70.5 |
| 59 | 18.4 | 35.6 | 43.8 | 52.3 | 60.7 | 68.5 |
| 60 | 21.2 | 39.8 | 48.2 | 56.7 | 64.8 | 72.2 |
| 61 | 18.0 | 34.9 | 43.0 | 51.6 | 60.0 | 67.8 |
| 62 | 14.6 | 29.6 | 37.2 | 45.5 | 54.0 | 62.3 |
| 63 | 17.2 | 33.8 | 41.8 | 50.3 | 58.8 | 66.7 |
| 64 | 17.2 | 33.8 | 41.8 | 50.3 | 58.8 | 66.7 |
| 65 | 22.3 | 41.4 | 49.8 | 58.3 | 66.3 | 73.5 |
| 66 | 30.2 | 51.5 | 59.9 | 67.8 | 74.8 | 80.7 |
| 68 | 22.5 | 41.6 | 50.1 | 58.6 | 66.5 | 73.7 |
| 70 | 21.5 | 28.6 | 36.1 | 44.3 | 52.8 | 61.2 |
| 72 | 16.2 | 22.0 | 28.4 | 35.9 | 44.0 | 52.6 |
| 73 | 20.9 | 27.9 | 35.3 | 43.4 | 52.0 | 60.4 |

a. See appendix H for a listing of the occfield names.

The SRB planner has two main goals:

1. To stay within the SRB budget
2. To fill the requirements (boatspaces) with reenlisting Marines.

In addition to these main goals, the SRB planner has a certain number of school seats that have been reserved for Marines who will move laterally into new PMOSs at the first reenlistment point. Because school seat planning must be done much earlier, these seats are set by PMOS and reserved in the By Name Assignment (BNA) file.

The process that the SRB planner previously used to get "first-cut" estimates of SRB levels that would stay within dollar constraints, get as many reenlistments from the PMOS as possible, and utilize the reserved school seats, was extremely tedious and time consuming. By programming several algorithms for the assignment process into the spreadsheet that the planner uses, the process has become automated.[87] We describe our work in this paper and will provide the automated spreadsheet on the CD for the sponsors for this study.

## CNA's automation of the bonus assignment process

We developed three scenarios for allocating Zone A SRB dollars.

### First cut: Scenario I

This cut uses the smallest SRB level that is greater than the number of reenlistments required by PMOS reenlisters. It may not be identical to the number of boatspaces in the PMOS because it excludes Marines expected to laterally move into the PMOS. In short, if all our modeling is correct, this cut will ensure that the Marine Corps fills its requirements for first-term reenlistments in the PMOS. In the language of the first-term planner's spreadsheet, it picks the smallest SRB level for which the reenlistment rate from the PMOS is greater than the (boatspaces - BNA seats)/population.[88] The resulting SRB

87. Theresa Kimble is responsible for this work.

88. The boatspaces are the required number of reenlistments in the PMOS, the BNA school seats are the number of school seats that have been allocated for lateral movers to this PMOS, and the population is the number of first termers in the PMOS who have an EAS in the fiscal year.

levels associated with the first cut are in the Z column of the planner's spreadsheet. Note that, if the EAS population in this PMOS is zero, the algorithm puts a "-1" as its SRB level. If the required number of reenlistments would require an SRB level greater than 5, the algorithm puts a "-2" as its SRB level.[89]

## Second cut: Scenario II

This cut uses the SRB level that produces the reenlistment rate required by PMOS reenlisters that is *closest* to the required reenlistments rate ((boatspaces - BNA seats)/population). The second cut will either be a lower SRB level or the same SRB level as the first cut. The SRB levels associated with this second cut are in the AA column of the planner's spreadsheet.

## Third cut: Scenario III

If the first and second cut produced the same SRB level and the SRB level is valid (between 0 and 5), the third cut will equal the SRB level of either the first or the second cut. Whether it is equal to the first or second cut depends on the planner's ratio and planner's constant (described below).

### Planner's ratio and planner's constant

The planner's ratio for each PMOS is essentially the required reenlistment rate from the EAS population *after* the school seats designated for lateral moves into the PMOS have been removed. It is:

$$Planner\ Ratio = \frac{Boatspaces\ in\ PMOS - BNA\ schoolseats\ for\ PMOS}{EAS\ population\ in\ PMOS}$$

If this ratio is small, it means that it should be easier to get the required number of reenlistments in the PMOS. For example, if the ratio is .05, it means that only 5 percent of the PMOS's EAS population is required to reenlist. If it is .30, it means that 30 percent of the EAS population in the PMOS will be required to reenlist.

89. Level 5 is the highest SRB that the Marine Corps gives.

The planner's constant is the value of the ratio set by the planner. We set this constant at .10, but the planner can vary it as part of the process toward determining SRB levels. With the planner's constant at .10, if the planner's ratio for the PMOS is greater than .10, the SRB level associated with the first cut is put in the third cut column (AB column). If the planner's ratio for the PMOS is less than .10, the SRB level associated with the second cut is put in the third-cut column.[90]

## Planner inputs to SRB allocation

All three of the model's cuts have SRB dollars associated with them.[91] Thus, the automated models tell the planner how much each scenarios would cost and how much money is allocated for Zone A SRBs. Now the planner must make some decisions. Column AC of the spreadsheet is the planner's column (all planner input cells in the spreadsheet are color coded in yellow). Typically, the planner would paste the results from the third cut into column AC to start the process. Normally, the problem would be that the SRB budget required to execute the third cut is larger than the actual SRB budget.

Various planner-helper columns can assist the SRB planner in assigning the set of multiples that will fit within the actual SRB budget and will do the best job filling required spaces. For example, columns BZ to CC in the spreadsheet isolate PMOSs that will cost substantial SRB dollars and that also have relatively large numbers of Marines.

The SRB planner and the CNA study team's modeling expert jointly developed this "decision model" design. It uses the logic that the SRB planner has used over the last few years to develop the SRB plan. This logic has been very successful, as the Marine Corps has stayed within its SRB budget and executed the FTAP extremely successfully.[92]

90. Small planner's ratios indicate PMOSs that have small reenlistment requirements relative to the EAS population. The second-cut SRB level is always less than or equal to the first-cut SRB level.

91. The dollar values of the SRBs are found in the spreadsheet.

92. The U.S. Congress recognized the effectiveness of the Marine Corps' SRB budget strategy in 2002. Although the other Services' budgets were cut, the Marine Corps' SRB budget was unchanged.

# Model validation and calibration

One of the study tasks is to provide an automated means of validating the predictive accuracy of the SRB reenlistment model by comparing forecasted and actual reenlistment behavior at the end of each fiscal year. Another study task addressed the calibration of the model—indicators to help gauge when the model should be reestimated.

Only one of the models reviewed (North (1994)) has been used to set bonus levels, and it does not include a formal validation or calibration process. Hansen and Wenger (2001) estimate models that exclude the last year of data and then use the model to predict reenlistment behavior in the remaining year of their data. But they use this technique only to choose among several models and are only interested in predicting overall reenlistment rates (not reenlistment rates by occfield). In summary, we could not identify any SRB validation models employed at the PMOS or rating level.

## Validation

### Zone A

The SRB planner has a detailed set of spreadsheets for first-term planning. We took the spreadsheets that the planner uses to monitor reenlistments throughout the year and, working with the planner, added a validation function. The Excel validation spreadsheets are found on the final study CD; here we outline the procedure. Table 7 uses FY03 data to illustrate the validation spreadsheet.[93]

In the June before the start of the fiscal year, the SRB planner obtains the counts of the Zone A EAS population for the next fiscal year (third column of table 7). Because our work indicated that this count may overestimate the actual numbers of Marines that will reach their

93. Table 7 is the SRB planner's "Output for Marines" worksheet, with the FY03 SRB values added to it. The validation also uses information from the "Data" and "020625 FY03 FTAP Mission prn fo" worksheets.

EAS as recommended and eligible Marines, we adjust the EAS population (column 4). Our adjustment figure was .92 (the user can use any adjustment factor desired (see upper left of table 7)).

Table 7. Example from Zone A validation spreadsheet: FY03 data

**Bounds** **8.0%**

**Adjustment factor** **.92**

| | EAS pop from June '02 data pull | | Adjusted EAS pop | |
|---|---|---|---|---|
| | All | SRB>0 | All | SRB>0 |
| PMOS count | 192 | 137 | 192 | 137 |
| Percentage of PMOSs within 8.0% of predicted | 78.1% | 75.0% | 80.9% | 78.9% |
| Number PMOSs with no EAS pop or missing | 9 | | 9 | |
| Number of PMOS with EAS pop < 3 | 2 | | 2 | |
| Number of PMOSs with predicted > actual | 80 | | 65 | |
| Number of PMOSs with actual > predicted | 103 | | 118 | |

| FY03 | | EAS pop | EAS pop | Actual reenlistment rate | | Predicted | Predicted - actual | |
|---|---|---|---|---|---|---|---|---|
| SRB value | MOS | (Jun 02) | (adjusted) | EAS pop | Adj EAS pop | Reen rate | EAS pop | Adj EAS pop |
| 0 | 0121 | 657 | 604 | 18.7% | 19.4% | 17.8% | -0.9% | -1.6% |
| 0 | 0151 | 643 | 592 | 34.5% | 37.0% | 34.1% | -0.5% | -2.9% |
| 0 | 0161 | 62 | 57 | 35.5% | 38.6% | 35.5% | 0.0% | -3.1% |
| 3 | 0211 | 0 | 0 | | | | | |
| 1 | 0231 | 189 | 174 | 24.3% | 26.4% | 38.6% | 14.3% | 12.2% |
| 3 | 0241 | 3 | 3 | 0.0% | 0.0% | 62.4% | 62.4% | 62.4% |
| 2 | 0261 | 41 | 38 | 17.1% | 15.8% | 14.6% | -2.4% | -1.2% |
| 1 | 0311 | 2,680 | 2,466 | 18.4% | 20.0% | 20.4% | 2.0% | 0.4% |
| 1 | 0313 | 140 | 129 | 17.1% | 18.6% | 29.0% | 11.8% | 10.4% |
| 2 | 0321 | 155 | 143 | 31.6% | 34.3% | 36.5% | 4.9% | 2.2% |

Columns 5 through 7 of table 7 are the reenlistment rates (actual rate computed from the June 2002 data pull, actual rate computed from the adjusted population, and the predicted reenlistment rate from our model). The last two columns are the differences between the predicted and actual reenlistment rates.

Since Zone A reenlistments are controlled (determined by the number of boatspaces in the PMOS), it is sometimes necessary to overwrite our predicted rates. (The estimated model and the predicted rates derived from it assume that all recommended and eligible Marines who want to reenlist in their PMOS can do so.) If our model predicted a reenlistment rate that was greater than what would be allowed (boatspaces/EAS population), we used the boatspaces/ EAS population number for the prediction rather than the rate predicted by our model. For example, if the model predicted a 30-percent reenlistment rate and the PMOS had an EAS population of 100, of which 15 were going to be allowed to reenlist, we overwrite the rate predicted by our model and use 0.15 as the "predicted" reenlistment rate.

To validate the model, the user selects the desired bounds for the difference between the predicted and actual reenlistment rates. In this example, the bound was 8 percent (see upper left-hand corner of table 7).[94] With an 8-percent bound, 78.1 percent of all PMOS reenlistment rates were predicted correctly (upper right of table 7). We are most interested in predicting reenlistment rates for PMOSs that have SRBs; with 8 percent bounds, 75.0 percent of the predicted reenlistment rates are correct. Finally, table 7 shows the percentage within the bounds if the adjusted EAS population is used as the denominator (80.9 percent and 78.9 percent for PMOSs with SRBs).

Table 8 shows the validation of the Zone A model for 2003 reenlistments with a variety of bounds.

Table 8. Validation of predicted reenlistment rates for Zone A: FY03

| | PMOS | | | |
|---|---|---|---|---|
| | | | Adjusted population[a] | |
| Zone A | All | SRB>0 | All | SRB>0 |
| Count of PMOSs | 192 | 137 | 192 | 137 |
| Percent correctly predicted | | | | |
| Within 5.0 percentage points | 65 | 59 | 66 | 60 |
| Within 7.5 percentage points | 77 | 74 | 75 | 71 |
| Within 10.0 percentage points | 86 | 84 | 84 | 82 |
| Within 12.5 percentage points | 90 | 90 | 87 | 87 |
| Within 15.0 percentage points | 92 | 93 | 90 | 91 |
| Within17.5 percentage points | 92 | 94 | 91 | 91 |
| Within 20.0 percentage points | 93 | 95 | 93 | 93 |

a. We used 92 percent of the EAS population identified in the June 2002 data pull.

94. Bounds are plus or minus—in this case, plus or minus 8 percent.

## Zones B and C

Because the Marine Corps lacks the elaborate planning process for career Marines that it has for Marines first entering the career force, the validation spreadsheets for Zones B and C were built from scratch. Each spreadsheet has three worksheets: an Output for Marines worksheet (FY03 validation for Zone C is shown in table 9); a Data worksheet that lists, by PMOS the SRB offered, the number of reenlisters and the total population (reenlisters plus those who separated); and a worksheet called New that lists, by occfield and SRB multiple, the reenlistments predicted from our model.

Table 9. Example from Zone C validation spreadsheet: FY03 data

**Bounds** **8.0%**

| | | | EAS pop > 2 | |
|---|---|---|---|---|
| | All | SRB>0 | All | SRB>0 |
| PMOS count | 214 | 92 | 154 | 60 |
| Percentage of PMOSs within 8.0% of predicted | 64.8% | 70.5% | 64.3% | 75.0% |
| No. of PMOSs with no EAS pop or missing | 4 | | 4 | |
| No. of PMOSs with predicted > actual | 101 | | 69 | |
| No. of PMOSs with actual > predicted | 109 | | 214 | |

| FY 03 SRB multiple | MOS | FY 03 Pop | Reen | Reenlistment rate Actual | Predicted | Predict. - actual |
|---|---|---|---|---|---|---|
| 0 | 0121 | 5 | 2 | 40.0% | 94.8% | 54.8% |
| 0 | 0151 | 14 | 8 | 57.1% | 94.8% | 37.6% |
| 0 | 0161 | 8 | 7 | 87.5% | 94.8% | 7.3% |
| 0 | 0193 | 131 | 121 | 92.4% | 94.8% | 2.4% |
| 3 | 0211 | 17 | 13 | 76.5% | 93.9% | 17.4% |
| 1 | 0231 | 37 | 34 | 91.9% | 90.4% | -1.5% |
| 0 | 0241 | 31 | 20 | 64.5% | 86.3% | 21.8% |
| 3 | 0251 | 2 | 2 | 100.0% | 93.9% | -6.1% |
| 0 | 0261 | 4 | 4 | 100.0% | 86.4% | -13.6% |
| 0 | 0311 | 13 | 5 | 41.7% | 92.8% | 54.3% |
| 0 | 0313 | 3 | 3 | 100.0% | 92.8% | -7.2% |
| 1 | 0321 | 32 | 29 | 90.6% | 95.0% | 4.4% |

Like the Zone A procedures, the user can select the bounds desired for determining the percentage of correct predictions. Because there are no restrictions on Zone B and C reenlistments, there is no need to overwrite any reenlistment rates predicted from our models in these zones.

In both Zones B and C, there are many very small PMOSs. Thus, we have included separate calculations that exclude PMOSs with less than three Marines when reporting validation results.

Table 10 summarizes the validation results for Zones B and C for the FY03 data. The model does considerably better predicting Zone C reenlistments than it does for Zone B.

Table 10. Validation of predicted reenlistment rates for Zones B and C: FY03 data

| | PMOS | | | |
|---|---|---|---|---|
| | All | SRB>0 | Marines>2 | SRB>0 and Marines>2 |
| Zone B count | 271 | 139 | 199 | 98 |
| Percent correctly predicted | | | | |
| Within 5.0 percentage points | 18 | 14 | 24 | 19 |
| Within 7.5 percentage points | 24 | 17 | 32 | 23 |
| Within 10.0 percentage points | 32 | 24 | 43 | 33 |
| Within 12.5 percentage points | 39 | 31 | 51 | 42 |
| Within 15.0 percentage points | 44 | 34 | 58 | 45 |
| Within17.5 percentage points | 54 | 48 | 69 | 59 |
| Within 20.0 percentage points | 61 | 60 | 76 | 71 |
| Zone C count | 214 | 92 | 154 | 60 |
| Percent correctly predicted | | | | |
| Within 5.0 percentage points | 30 | 49 | 31 | 48 |
| Within 7.5 percentage points | 62 | 69 | 62 | 73 |
| Within 10.0 percentage points | 68 | 74 | 67 | 78 |
| Within 12.5 percentage points | 70 | 74 | 71 | 78 |
| Within 15.0 percentage points | 73 | 74 | 74 | 78 |
| Within17.5 percentage points | 75 | 77 | 77 | 83 |
| Within 20.0 percentage points | 78 | 78 | 78 | 85 |

# Calibration

We are providing our sponsors with all the data and computer programs used to estimate models in this study. We believe that the entire model should be reestimated when FY06 reenlistment data are available. We believe that calibration of this model will not be too difficult:

- The data through FY03 decisions are already prepared.
- The computer programs necessary to extract FY04 through FY06 decisions from the Stat files in the TFDW are written.
- The computer programs to estimate the models are written.

# A comparison of lateral moves and SRBs to induce additional reenlistments

Although the SRB Program is the primary tool available to Marine Corps planners for shaping the career force, planners can also choose to laterally move eligible Marines from oversubscribed PMOSs into PMOSs that are short reenlistments.[95] Because there is no lateral entry into the Marine Corps, reenlistments from the PMOS or lateral moves are the primary options available to fill Zone A boatspaces.[96] We examine the relative costs of these two strategies to fill PMOSs that are short reenlistments.

Before doing so, however, we note that the Marine Corps uses lateral moves very sparingly and only after bonuses have failed to produce the desired reenlistment rate. Cost estimates that follow are predicated on this assumption, which is reinforced by the way in which the Marine Corps structures its lateral-move application process.

Although Zone A Marines are allowed to reenlist any time in the fiscal year of their EAS, lateral moves are not allowed until January. In addition, Marines cannot apply for a lateral move *unless* there are no more boatspaces in their PMOS (i.e., their PMOS is closed). By waiting until January to open up lateral moves, the Marine Corps achieves:

95. Although SRBs are paid to Marines in all three zones, lateral moves are concentrated in Zone A. In this section, therefore, we will focus exclusively on lateral moves at the Zone A decision point.

96. The First-Term Alignment Plan (FTAP) specifies the number of Zone A reenlistments by PMOS. Currently, a small number of prior-service Marines are allowed to return to the Corps if there is a boatspace in the FTAP in their PMOS. This boatspace restriction for prior-service reenlistments is necessary to ensure that the Marine Corps reenlists Marines with the right mix of PMOSs for the career force. It is important that this restriction be maintained; in the past, it has sometimes been relaxed. For details on the development of FTAP, see Quester and North (1992).

- A "fairer" allocation of the lateral move spaces. By January, a larger number of PMOSs will be closed and more Marines will have a chance to move laterally.
- An increase in PMOS reenlistments. Because lateral moves are not possible until January, it is unknown which PMOSs will be open for lateral moves at that time, and Marines cannot know *if* they will qualify for a lateral move PMOS;[97] some Marines—some of whom might actually prefer a lateral move—instead reenlist in their PMOS to ensure a boatspace.

Although the Marine Corps strives to make lateral-move policies as fair as possible, a Marine whose PMOS remains open (the PMOS still has available boatspaces) is ineligible for a lateral move. Thus, Marines in open PMOSs who want to remain in the Corps but do not like their PMOSs, face difficult choices:

- They can reenlist in the PMOS they dislike to ensure that they can remain in the Marine Corps
- They can wait and hope their PMOS closes so they can apply for a lateral move. But lateral-move slots will fill as the year progresses, and there may be no lateral-move opportunities for which they qualify by the time their PMOS closes.

If their PMOS does not close, or if their PMOS closes but their test scores do not qualify them for the remaining lateral-move MOSs, they will have to leave the Marine Corps at EAS.

In summary, Marine Corps lateral-move policies are designed both to increase the number of reenlistments from the EAS population in the PMOS and to hold down the number of lateral moves. In FY03, about 10 percent of boatspaces were filled with lateral movers and about 4percent were filled with prior-service Marines; the rest were filled by Marines reenlisting in their PMOSs.

97. In addition to being recommended and eligible for reenlistment, lateral movers must have test scores that qualify them for admission to the A-schools for the new PMOS training.

## SRBs

SRBs can be targeted specifically at those PMOSs where reenlistments without an SRB are not expected to meet the required number of reenlistments. Reenlistment rates vary greatly by occfield, and our statistical work estimated prediction models for each occfield in each reenlistment zone. Table 6 illustrated predicted FY03 occfield reenlistment rates by SRB levels for Zone A. We reproduce part of that table here for three occfields (see table 11).

Table 11. Zone A predicted reenlistment rates for FY03 by occfield and SRB multiple[a]

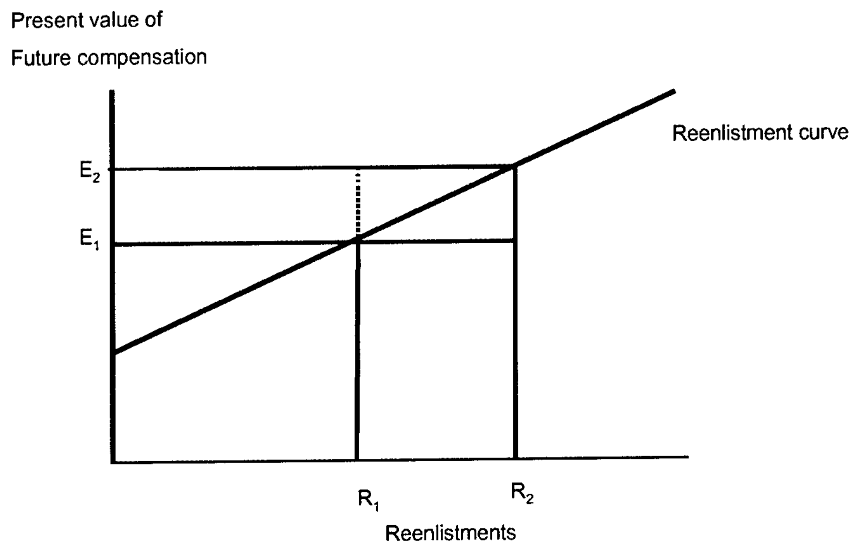
| | SRB multiple level | | | | | |
|---|---|---|---|---|---|---|
| Occfield | 0 | 1 | 2 | 3 | 4 | 5 |
| 01 Personnel administration | 36.0 | 58.0 | 66.0 | 73.2 | 79.4 | 84.4 |
| 03 Infantry | 14.3 | 28.9 | 36.5 | 31.3 | 53.2 | 61.6 |
| 61 Aircraft maintenance helicopter | 18.0 | 34.9 | 43.0 | 51.6 | 60.0 | 67.8 |

a. Selected occfields taken from table 6.

In general, combat arms occfields have low reenlistment rates (illustrated by 03, infantry), whereas the less technical support occfields have the highest rates (illustrated by 01, personnel administration). The technical support PMOSs generally have reenlistment rates in between (illustrated by 61, aircraft maintenance helicopter). As bonus multiples increase, so do predicted reenlistment rates. Planners can vary the size of the bonus depending on the magnitude of the change in the reenlistment rate desired.

The costs of inducing a reenlistment with an SRB can be substantial. The expense is high because any bonus offered must be paid to *all* Marines who reenlist in that PMOS—including those who would have reenlisted without the SRB. Figure 12 describes the relationship between bonuses, reenlistment rates, and costs for a hypothetical PMOS.

Figure 12. Compensation levels and reenlistments




In this figure, the number of reenlistments is plotted on the horizontal axis, and the discounted present value of future compensation is plotted on the vertical axis. The reenlistment curve plots the relationship between compensation and reenlistments. Suppose that $R_1$ is the number of reenlistments we would observe in this PMOS at compensation level $E_1$, which has no SRB. Suppose that with an SRB multiple of 1, compensation would equal $E_2$ and the number of reenlistments would be $R_2$. We ask, how much did each reenlistment beyond $R_1$ cost? The shaded area to the right of the $R_1$ segment is the value of the SRB payments to the additional reenlisters. However, even though the original $R_1$ reenlisters did not need a bonus to reenlist, they would still receive one. Payment to the original $R_1$ reenlisters is the value of the shaded area to the left of $R_1$. Thus, the cost of inducing the $R_2$ - $R_1$ reenlistments is the entire shaded region.

Costs per additional reenlistment will vary with the characteristics of the PMOS. If the reenlistment curve is flatter, indicating that additional reenlistments can be obtained relatively cheaply, the costs per additional reenlistment will be smaller. Costs per induced reenlistment are higher when the current reenlistment rate is high because many Marines who would have enlisted without the bonus will be paid the bonus if it is offered to the PMOS. Consider, for example, Zone C reenlistments where the average reenlistment rate is 82 percent. Our model suggests that 91.5 percent of Field Artillery Zone C Marines will reenlist without a bonus. An SRB bonus multiple of 1 will raise the reenlistment rate to 93.2 percent: giving a level 1 SRB bonus causes only 1.7 percent more Marines to reenlist, but it must be given to all Marines who reenlist.[98]

## Computing costs of additional reenlistments from SRBs

To compute the cost of an additional reenlistment at each SRB multiple level, we apply the following formula:

$$B_{M+1} = \frac{(\{MBP \times YRS \times R_M\} + ((R_{M+1} - R_M) \times M \times MBP \times YRS))}{(R_{M+1} - R_M)}$$

where:

$B_{M+1}$ = the bonus cost per additional reenlistment,

MBP = monthly basic pay,

YRS = contract length,

$R_{M+1}$ = number of reenlistments at multiple level m+1,

$R_{M+1}$ - $R_m$ = the increase in reenlistments from increasing the multiple level from M to M+1,

M = the bonus multiple level

> and M goes from 0 to 5. Note: When M = 0, $R_{m+1} = R_1$ (the number of reenlistments with no bonus); when M = 5, $R_{m+1} = R_5$ (the number of reenlistments with a level 5 bonus).

The first term in the equation represents the amount paid to those who would have reenlisted without the new bonus and the second term represents the total payment to those who reenlist because of the increase in the bonus. The sum of these two terms is divided by the increase in reenlistments.

98. The SRB payments to those 87.3 percent who would have reenlisted without the bonus is an example of what economists call *economic rent.*

We can compute this cost for each occfield and for each bonus level. Table 8 showed the predicted reenlistment rate for FY03 in the personnel administration occfield 01 to be 36.0 percent with no SRB, 58.0 percent with a level-1 SRB, and 66.0 percent with a level-2 SRB. Using those predicted reenlistment rates, the formula calculates the cost per additional reenlistment in FY03 from changing the bonus multiple from zero to one to be $18,465. Increasing the multiple from one to two costs $64,419 per additional reenlistment. Table 12 shows examples of these results (full results are in appendix F).

Table 12. Zone A dollar cost per additional reenlistment for bonus multiple changes in select occfields[a]

| Occfield | Bonus multiple change | | | | |
|---|---|---|---|---|---|
| | 0-1 | 1-2 | 2-3 | 3-4 | 4-5 |
| 01 Personnel administration | 18,465 | 64,419 | 85,002 | 111,131 | 145,069 |
| 03 Infantry | 13,780 | 40,965 | 51,974 | 64,622 | 79,577 |
| 61 Aircraft maintenance helicopter | 14,403 | 44,084 | 56,366 | 70,807 | 88,286 |

a. Full table can be found in table 23 of appendix F.

As can be seen from the range of dollar values in this table, bonus costs vary by occfield and by bonus level. As the SRB multiple goes from zero to one, most bonus costs for an additional reenlistment were between $14,000 and $19,000. For all occfields, the cost per induced reenlistment increases with the bonus multiple.

## Lateral moves

A second way to increase inventories of career force Marines in short PMOSs is to allow Marines to laterally move (i.e., allow those in over-subscribed PMOSs to transfer into under-subscribed PMOSs). There are three types of costs to consider for lateral moves:

- *Training costs.* The cost of sending a fully trained Marine back to initial PMOS training for the new PMOS
- *Supply costs.* The cost of obtaining a Marine willing to execute a lateral move

- *Current and future readiness costs.* The current readiness cost is the cost attributable to the absence of the Marine from the operating forces during the training period. The future readiness cost is due to performance reductions since the laterally trained Marine (who is relatively less experienced) is not competitive with those in his or her *new* PMOS.

We approximate the first set of costs using data developed in Quester et al. (2003). The second set has been assumed to be zero in the past, meaning that the Marine Corps has not needed to provide any additional compensation to get Marines to volunteer for lateral moves. Since the Marine Corps has not paid SRBs to regular lateral movers (those moving to an PMOS that begins at entry level), there are no data from which to estimate what these costs might be. Thus, we continue to assume that the costs of obtaining a Marine willing to execute a lateral move are zero.[99] The third set of costs have been qualitatively explored in North (1994).

## Training costs

An earlier study on the relative costs of SRB and lateral-move reenlistments derived the costs of initial skill training using very detailed information on training, schoolhouse costs, personnel costs, and attrition costs that had been compiled for another study—one mandated by Congress that cost millions of dollars.[100] Unfortunately, the

99. Although the Marine Corps has not done so, paying an SRB to regular lateral movers (while quite costly) could still be a cost-efficient strategy—particularly if the EAS population in the PMOS is not large enough to support reenlistment requirements and planners do not expect sufficient numbers of voluntary lateral movers. In fact, recent policy has allowed some "lateral movers" to PMOSs that begin at paygrade E-5 to receive SRBs. Because these PMOSs begin at E-5, they have no reenlistment population. As such, these "lateral movers" are not relevant to the comparisons between SRBs for the EAS population versus lateral moves to fill reenlistment slots.

100. See North (1994). This was a unique dataset constructed for the Job Performance Measurement Study. See Mayberry and Carey (1993) and Mayberry (1990).

Marine Corps does not compile training costs by PMOS, and the cost of trying to obtain them is well beyond this study's budget.[101]

The 2002 Critical Indicators Study developed a methodology for calculating the average time it takes to become occupationally qualified and provided time-to-train days for each PMOS. Past research indicated that training costs were directly related to training time: training costs could be approximated by multiplying the number of days in training by daily base pay for the trainee and by a scale factor. Thus, we monetize the number of training days for training costs.

The "time to train" is the time between the beginning of bootcamp (yellow footprints) and assignment to a primary PMOS. It includes time spent in training, as well as time spent waiting for training to begin, transit time, and so on. These calculations were for new recruits and included 122 days that lateral movers would not be required to complete (MCRD, boot leave, and Marine combat training (MCT)).[102] We subtract the time it takes for this non-MOS training from the average training time for each PMOS, assuming waiting time in training would occur for lateral movers at the same rate it occurs for new recruits.

The typical lateral mover is an E-4 with 4 completed years of service with monthly base pay of $1,749 ($57 per day). We compute the total cost of training as 3.0*$57*PMOS training days, adding in updated estimates of ammunition costs during training for those PMOSs that use ammunition heavily.[103] We use schoolhouse attrition rates supplied by the first-term planner to calculate the cost of a lateral-move

101.For a variety of reasons, we would argue that the Marine Corps should have training cost data. Such data are invaluable inputs to the solutions of a variety of policy questions. However, such data are not available and the costs of trying to construct them for one particular study are prohibitive. That said, it is extremely difficult to estimate training costs, as many different budgetary accounts are involved and many costs are hidden inside larger accounts.

102.Infantry Marines do not go to MCT, so we did not subtract the MCT days for 03 Marines.

103.We used the consumer price index to update the ammunition costs for PMOS training provided in North (1994).

graduate.[104] In other words, in a PMOS where 10 percent of the trainees attrite, the training cost must be rescaled by dividing by 0.9. Table 13 presents the training costs for select PMOSs (see appendix G for the complete set of PMOSs). As is clear from even this small set of PMOSs, there is substantial variation in training costs.

Table 13. Estimated training costs for select PMOSs

| PMOS | PMOS name | Training cost[a] | Fraction completing training[b] | Training cost (attrition accounted for) |
|---|---|---|---|---|
| 0121 | Personnel clerk | $12,141 | 1.00 | $12,141 |
| 0151 | Administrative clerk | $11,970 | 1.00 | $11,970 |
| 0161 | Postal clerk | $10,089 | 0.93 | $10,848 |
| 0231 | Intelligence specialist | $25,308 | 0.92 | $27,509 |
| 0261 | Geographic intelligence specialist | $54,720 | 0.90 | $60,800 |
| 0311 | Rifleman | $12,312 | 0.95 | $12,960 |
| 0313 | LAV crewman | $21,546 | 0.90 | $23,940 |
| 0321 | Reconnaissance man | $55,062 | 0.80 | $68,828 |
| 0331 | Machinegunner | $13,509 | 0.95 | $14,220 |
| 0341 | Mortarman | $13,509 | 0.95 | $14,220 |
| 0351 | Assault man | $13,167 | 0.95 | $13,860 |

a. As described in the text, these are the average training days monetized. The monetized figure represents 3 times the average days for the PMOS training in the year ending May 2002 times the daily rate for a Corporal who has completed 4 years of service. We also include ammunition costs.

b. These are from the first-term planner, and represent historical attrition rates for the schoolhouses.

## Readiness costs

### Current readiness costs

In contrast to same-MOS-reenlistments, lateral-move Marines need to undergo A-school training for their new PMOS. While they are in

104.These schoolhouse attrition rates apply to all Marines undergoing the training, not just lateral-move Marines.

training, they count for Marine Corps endstrength but are not available for operational assignments. Thus, there is a cost associated with their absence. Unfortunately, there is no available information on the monetary costs associated with gapped billets in the operational forces.

### Future readiness costs

North (1994) analyzes the future performance of lateral movers, comparing lateral movers with Marines who did not switch PMOSs. He looks at non-EAS attrition, promotions, and occupational task performance. He finds that there are no differences in non-EAS attrition between the two groups, but finds lower E-5 promotion rates at 78 months of service for lateral movers. By 90 months, lateral movers and those that do not move have the same probability of being E-5s (although E-5 by 90 months is not a high benchmark).[105]

Earlier work from the Job Performance study compared helicopter mechanics who must perform a more complex set of tasks with auto mechanics. Analysis showed that the proficiency of helicopter mechanics increased steadily between 12 and 48 months service. Helicopter mechanics at 48 months scored 15 percent better on performance measures than mechanics at 12 months. In contrast, auto mechanics only improved by 5 percent. North cites this example as a warning—there will be long-term costs associated with using lateral moves to fill vacancies in technical PMOSs. There are also costs in the first 12 months on the job, but we have no information about them—for example, how much on-the-job training is required?

Thus, we have only indirect information on readiness costs of lateral moves, and this indirect information is only for Marines in their first-term of service.

Against this backdrop of caveats, we estimate that the readiness and OJT costs of a lateral move are 3 times the pay of the Marine while he or she is in training.

105.For example, the Marine Corps target for an E-6 promotion is only 1 year later (102 months).

## Computing costs of additional enlistments from lateral moves

Because the study tasking required costing of lateral moves, we have made an attempt to estimate these costs, but we urge caution in interpretation. These estimates are crude, particularly with respect to the costs of gapped operational billets while lateral movers are in training and the on-the-job costs of getting lateral movers "up to speed" in their new PMOSs. In addition, all estimates assume that no additional compensation is necessary to get Marines to execute lateral moves. Table 14 shows these estimates for a select group of PMOSs (see table 24 in appendix G for a complete list).

Table 14. Estimated training and on-the-job training/readiness costs for lateral moves in select PMOSs

| PMOS | Name | A-school training cost[a] | OJT cost estimate[b] | Total lateral move training cost |
|---|---|---|---|---|
| 0121 | Personnel clerk | $12,141 | $12,141 | $24,282 |
| 0151 | Administrative clerk | $11,970 | $11,970 | $23,940 |
| 0161 | Postal clerk | $10,848 | $10,089 | $20,937 |
| 0231 | Intelligence specialist | $27,509 | $25,308 | $52,817 |
| 0261 | Geographic intelligence specialist | $60,800 | $54,720 | $115,520 |
| 0311 | Rifleman | $12,960 | $12,312 | $25,272 |
| 0313 | LAV crewman | $23,940 | $21,546 | $45,486 |
| 0321 | Reconnaissance man | $68,828 | $55,062 | $123,890 |
| 0331 | Machinegunner | $14,220 | $13,509 | $27,729 |
| 0341 | Mortarman | $14,220 | $13,509 | $27,729 |
| 0351 | Assault man | $13,860 | $13,167 | $27,027 |

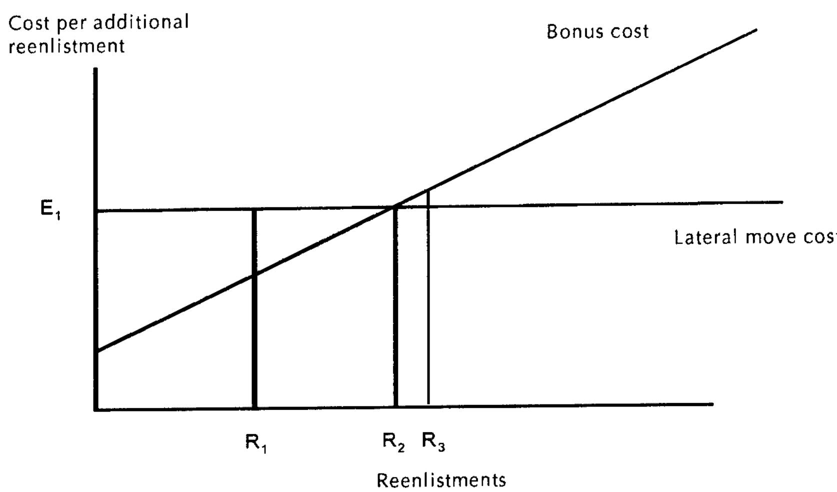
a. See table 13, last column.
b. These represent our estimates of the OJT costs and the readiness costs of gapped billets while the Marine is training for the new PMOS.

In conjunction with our estimates on the costs of obtaining additional reenlistments through SRBs (text table 12 and table 23 in appendix F), SRB planners can use these lateral-move cost estimates to help guide their thinking about lateral moves.

## Comparison of the costs of bonuses and lateral moves

Theoretically, we can compare costs for the two methods of filling boatspace requirements in a PMOS.[106] In figure 13, the lateral-move cost is depicted as a horizontal line, following our assumption that no additional payments will be required to induce Marines to make lateral moves. In contrast, the bonus costs an additional reenlistment increase as the required number of Marines increases. Bonuses are depicted by the upward-sloping bonus cost curve (calculated from the formula in the "Computing SRB costs" section).

Figure 13. Lateral moves vs. SRBs: shaded area shows cost-effective solution for R3 reenlistments




We compare three potential reenlistment rates: Suppose that $R_1$ Marines would reenlist without a bonus, but requirements suggest that $R_3$ should be retained. Achieving $R_3$ reenlistments with SRBs would cost the area between $R_1$ and $R_3$ under the bonus cost curve. Achieving $R_3$ reenlistments with lateral moves would cost the area between $R_1$ and $R_3$ under the lateral-move cost curve. A less expensive option

106.We follow the discussion in North (1994).

would be to employ a combination approach: use bonuses to achieve $R_2$ reenlistments and then fill the rest of the boatspaces in this PMOS with lateral moves. The cost of this option would be the shaded area, which is smaller than the cost of the other approaches.

By comparing information in table 12 (see table 23 in appendix F for a complete list), with the information in table 14 (table 24 in appendix G for a complete list), one can compare the relative costs of obtaining additional Zone A reenlistments through SRBs or lateral moves.

## Final caveats on the relative costs of bonuses and lateral moves

It is straightforward to calculate the costs of obtaining additional reenlistments by SRBs, but it should be remembered that all of these costs are by occfield rather than PMOS. It is less straightforward to calculate the costs of obtaining additional reenlistments through lateral moves. We can only compare costs based in the limited way the Marine Corps has used lateral moves historically—moving small numbers of Marines in oversubscribed PMOSs without any additional compensation. The cost, in this case, of the lateral move is the sum of the training and readiness costs for each Marine laterally moved. Although we have attempted to quantify the readiness and OJT costs of each lateral move, we have no empirical basis for our estimates. We know that the Marine Corps perceives the readiness costs of laterally trained Marines to be very high: the Marine Corps' clear preference has been to retain Marines in their PMOSs and to use lateral moves only as a last resort.

Retaining Marines using SRBs has a number of advantages over laterally moving Marines into these positions. Retaining personnel in the PMOS *in which they have experience* saves money in a number of ways: experienced personnel perform their jobs more efficiently and, because retained personnel already have completed their initial skill training, the Marine Corps incurs no further training costs. SRBs are effective because they are targeted to specific PMOSs and the program can be adapted relatively easily and quickly in response to supply or demand changes.

## Identifying lateral movers

After considerable time trying to identify lateral movers in the historical dataset, we decided that it was not possible to separate lateral moves from the numerous PMOS changes that have occurred over time. We strongly recommend that the Marine Corps establish a new data field that identifies lateral movers. With such a data field, it will be possible in the future to investigate the success of lateral move programs more completely.

# Conclusions and summary

The Marine Corps' decision to switch from anniversary to lump-sum payments for SRBs was a very good one. Our estimates of the increased reenlistment rates when SRBs are paid as lump sums are both large and statistically significant.[107] For FY03, we estimate the Marine Corps saved at least $8 million in Zone A and another $10 million in Zone B compared to what it would have had to pay to obtain the same number and PMOS composition of reenlistments had the payments been timed, rather than lump sum.

The paper reviewed the literature on the relationship between selective reenlistment bonuses (SRBs) and reenlistment rates and discussed the Marine Corps' gains from switching to a lump-sum payment plan. After discussing the dataset, model, and variables that we would use to estimate reenlistment rates with and without the lump-sum payments, we reported our estimated logistic regression models for Zone A, B, and C reenlistments.

Next, we turned to our occupational field (occfield) reenlistment prediction models for each zone. These prediction models isolate the impact of different SRB multiples on reenlistment probabilities. We then discussed the automated mechanisms we developed to assist planners in assigning bonus levels.

We presented a validation and calibration method. The validation method allows for measurement of the model's performance, and the calibration method suggests when it may be appropriate to redo the analysis. Finally, we discussed the relative costs and benefits of SRBs versus lateral moves in Zone A for filling boatspaces in undermanned areas.

107.The lump-sum variable was not statistically significant in Zone C—we believe because insufficient numbers of lump-sum bonuses have been offered in Zone C. In a couple of years, it will probably be possible to estimate a statistically significant impact for Zone C lump-sum bonuses.

# Appendix A: Zone A logistic regressions

Table 15. Logistic regression estimates for Zone A reenlistment decisions: FY85-03[a]

| Variables | Coefficient | t-statistic | 95% confidence interval | | Mean value |
|---|---|---|---|---|---|
| SRB multiple | 0.342 | 74.24 | 0.333 | 0.351 | 0.735 |
| Lump-sum SRB | 0.554 | 30.54 | 0.519 | 0.590 | 0.069 |
| Mil to civ pay ratio | 0.219 | 2.25 | 0.028 | 0.410 | 1.065 |
| Unemp rate 20-24 males | 1.603 | 5.66 | 1.408 | 2.157 | 0.098 |
| *Male* | *0.023* | *1.32* | *-0.011* | *0.058* | 0.951 |
| Black | 0.830 | 74.74 | 0.808 | 0.852 | 0.149 |
| Hispanic | 0.180 | 13.08 | 0.153 | 0.207 | 0.098 |
| AFQT ge 50 | -0.070 | -6.39 | -0.091 | -0.048 | 0.639 |
| AFQT ge 50 if SRB>0 | 0.114 | 7.50 | 0.084 | 0.1447 | 0.226 |
| Dependents or married | 0.691 | 84.25 | 0.675 | 0.707 | 0.457 |
| Relative rank | 2.775 | 87.22 | 2.712 | 2.837 | 1.005 |
| Drawdown 92-97 | -0.183 | -15.56 | -0.207 | -0.160 | 0.313 |
| Occ 01[b] | 1.219 | 66.87 | 1.184 | 1.255 | 0.057 |
| Occ 02 | 0.719 | 15.66 | 0.629 | 0.810 | 0.007 |
| Occ 04 | 0.670 | 23.42 | 0.614 | 0.726 | 0.020 |
| Occ 05 | 0.537 | 3.19 | 0.207 | 0.866 | 0.000 |
| Occ 06 | 0.385 | 23.08 | 0.352 | 0.418 | 0.088 |
| Occ 08 | 0.218 | 8.43 | 0.167 | 0.269 | 0.031 |
| Occ 11 | 0.490 | 16.42 | 0.431 | 0.548 | 0.020 |
| Occ 13 | 0.515 | 25.96 | 0.476 | 0.554 | 0.055 |
| Occ 18 | 0.168 | 5.28 | 0.106 | 0.230 | 0.020 |
| Occ 21 | 0.432 | 15.87 | 0.378 | 0.485 | 0.024 |
| Occ 23 | 0.482 | 11.66 | 0.401 | 0.564 | 0.009 |
| Occ 26 | 0.222 | 5.63 | 0.145 | 0.300 | 0.011 |
| Occ 28 | 0.098 | 3.41 | 0.042 | 0.155 | 0.022 |
| Occ 30 | 0.989 | 52.17 | 0.952 | 1.026 | 0.053 |
| Occ 31 | 1.055 | 18.52 | 0.944 | 1.167 | 0.004 |
| Occ 33 | 0.615 | 22.58 | 0.561 | 0.668 | 0.023 |
| Occ 34 | 1.107 | 27.47 | 1.028 | 1.186 | 0.009 |

Table 15. Logistic regression estimates for Zone A reenlistment decisions: FY85-03[a] (continued)

| Variables | Coefficient | t-statistic | 95% confidence interval | | Mean value |
|---|---|---|---|---|---|
| Occ 35 | 0.493 | 29.22 | 0.460 | 0.526 | 0.086 |
| Occ 41 | 2.585 | 14.10 | 2.225 | 2.944 | 0.000 |
| Occ 43 | 0.601 | 6.90 | 0.430 | 0.771 | 0.002 |
| Occ 44 | 1.267 | 19.87 | 1.142 | 1.392 | 0.003 |
| Occ 46 | 0.936 | 15.65 | 0.819 | 1.054 | 0.004 |
| Occ 55 | 1.084 | 20.34 | 0.979 | 1.188 | 0.005 |
| Occ 57 | 0.750 | 12.61 | 0.634 | 0.867 | 0.004 |
| Occ 58 | 0.402 | 15.45 | 0.351 | 0.453 | 0.029 |
| Occ 59 | 0.307 | 7.316 | 0.224 | 0.389 | 0.010 |
| Occ 60 | 0.482 | 20.07 | 0.435 | 0.529 | 0.042 |
| Occ 61 | 0.276 | 10.81 | 0.226 | 0.325 | 0.028 |
| *Occ 62* | *0.031* | *-0.31* | *-0.079* | *0.057* | 0.018 |
| Occ 63 | 0.225 | 7.36 | 0.165 | 0.285 | 0.021 |
| Occ 64 | 0.225 | 7.13 | 0.163 | 0.287 | 0.019 |
| Occ 65 | 0.549 | 16.50 | 0.483 | 0.614 | 0.015 |
| Occ 66 | 0.957 | 19.57 | 0.861 | 1.053 | 0.006 |
| Occ 68 | 0.559 | 5.89 | 0.373 | 0.745 | 0.002 |
| Occ 70 | 0.558 | 15.89 | 0.489 | 0.626 | 0.013 |
| Occ 72 | 0.205 | 5.05 | 0.125 | 0.284 | 0.010 |
| Occ 73 | 0.522 | 7.67 | 0.389 | 0.656 | 0.003 |
| AFQT missing | 0.605 | 24.01 | 0.556 | 0.654 | 0.023 |
| Constant | -5.486 | -48.02 | -5.710 | -5.262 | 1.000 |

| | |
|---|---|
| Average reenlistment rate | .263 |
| Number observations | 365,975 |
| Chi square | 50,183 |

a. Variables that are not statistically significant at the 1-percent level are shown in italics.

b. The omitted occupational field is 03.

Table 16. Logistic regression estimates for Zone A reenlistment decisions, without occfield dummy variables: FY85-03[a]

| Variable | Coefficient | t-statistic | 95% confidence interval | | Mean value |
|---|---|---|---|---|---|
| SRB multiple | 0.331 | 76.59 | 0.322 | 0.339 | 0.735 |
| Lump-sum SRB | 0.351 | 19.95 | 0.317 | 0.386 | 0.069 |
| Mil to civ pay ratio | .598 | 6.25 | 0.411 | 0.786 | 1.065 |
| Unemp rate 20-24 males | 1.442 | 26.72 | 7.634 | 8.843 | 0.098 |
| **Male[b]** | -0.266 | -15.47 | -0.300 | -0.232 | 0.951 |
| Black | 0.963 | 89.10 | 0.941 | 0.984 | 0.149 |
| Hispanic | 0.269 | 19.85 | 0.243 | 0.296 | 0.098 |
| *AFQT ge 50* | *-0.014* | *-1.33* | *-0.034* | *0.007* | 0.639 |
| AFQT ge 50 if SRB>0 | 0.050 | 3.34 | 0.021 | 0.079 | 0.226 |
| Dependents or married | 0.714 | 88.09 | 0.698 | 0.730 | 0.457 |
| Relative rank | 2.696 | 86.35 | 2.635 | 2.757 | 1.005 |
| Drawdown 92-97 | -0.241 | -20.74 | -0.264 | -0.219 | 0.313 |
| AFQT missing | 0.617 | 24.80 | 0.568 | 0.666 | 0.023 |
| Constant | -5.102 | -45.34 | -5.322 | -4.881 | 1.000 |

| | |
|---|---|
| Average reenlistment rate | .263 |
| Number observations | 365,975 |
| Chi square | 43,051 |

a. Variables that are not statistically significant are shown in italics.

b. The male coefficient changed significantly when the Occupational field dummy variables were excluded in this regression. Male Marines reenlist at significantly lower rates than female Marines in this regression when we do not control for occupation; however, controlling for occupation (table 15) makes the gender variable essentially zero. This is because female Marines are concentrated in occupations with high reenlistment rates.

Note: All other variables are robust to the two specifications presented here.

# Appendix B: Zone B logistic regressions

Table 17. Logistic regression estimates for Zone B reenlistment decisions: FY85-03[a]

| Variable | Coefficient | t-statistic | 95% confidence interval | | Mean value |
|---|---|---|---|---|---|
| SRB multiple | 0.318 | 33.17 | 0.299 | 0.337 | 0.448 |
| Lump-sum SRB | 0.274 | 4.70 | 0.160 | 0.388 | 0.027 |
| Mil to civ pay ratio | 2.148 | 12.88 | 1.821 | 2.475 | 1.056 |
| Unemp rate 25-34 male | 2.698 | 4.11 | 1.411 | 3.984 | 0.056 |
| Male | 0.209 | 6.59 | 0.147 | 0.272 | 0.940 |
| Black | 0.585 | 30.37 | 0.547 | 0.622 | 0.232 |
| Hispanic | 0.237 | 8.66 | 0.183 | 0.290 | 0.085 |
| AFQT ge 50 | -0.240 | -12.58 | -0.277 | -0.202 | 0.582 |
| Dependents or married | 0.525 | 29.74 | 0.490 | 0.560 | 0.796 |
| Drawdown 92-97 | -0.097 | -5.18 | -0.134 | -0.060 | 0.309 |
| Relative rank | 7.074 | 76.62 | 6.893 | 7.255 | 0.996 |
| Occ 01[b] | 0.533 | 15.64 | 0.467 | 0.600 | 0.079 |
| *Occ 02* | *-0.057* | *-0.88* | *-0.185* | *0.070* | 0.017 |
| Occ 04 | 0.348 | 6.62 | 0.245 | 0.451 | 0.026 |
| *Occ 05* | *0.345* | *1.27* | *-0.187* | *0.877* | 0.001 |
| *Occ 06* | *-0.030* | *-0.92* | *-0.093* | *0.034* | 0.080 |
| *Occ 08* | *-0.003* | *-0.06* | *-0.101* | *0.095* | 0.025 |
| Occ 11 | 0.337 | 5.89 | 0.225 | 0.449 | 0.019 |
| Occ 13 | 0.236 | 6.00 | 0.159 | 0.313 | 0.046 |
| *Occ 18* | *-0.061* | *-0.96* | *-0.185* | *0.063* | 0.014 |
| Occ 21 | 0.210 | 4.22 | 0.112 | 0.307 | 0.026 |
| Occ 23 | 0.384 | 5.12 | 0.237 | 0.531 | 0.012 |
| *Occ 26* | *-0.088* | *-1.29* | *-0.223* | *0.046* | 0.013 |
| Occ 28 | -0.210 | -4.26 | -0.306 | -0.113 | 0.030 |
| Occ 30 | 0.466 | 13.23 | 0.397 | 0.535 | 0.068 |
| Occ 31 | 0.482 | 4.32 | 0.263 | 0.701 | 0.005 |
| Occ 33 | 0.199 | 3.85 | 0.098 | 0.301 | 0.024 |
| Occ 34 | 0.392 | 5.42 | 0.250 | 0.534 | 0.012 |
| Occ 35 | 0.205 | 6.20 | 0.140 | 0.269 | 0.073 |

Table 17. Logistic regression estimates for Zone B reenlistment decisions: FY85-03[a] (continued)

| Variable | Coefficient | t-statistic | 95% confidence interval | | Mean value |
|---|---|---|---|---|---|
| Occ 41 | 0.714 | 4.18 | 0.379 | 1.049 | 0.002 |
| *Occ 43* | *-0.046* | *-0.39* | *-0.278* | *0.186* | 0.004 |
| Occ 44 | 0.390 | 3.68 | 0.182 | 0.597 | 0.005 |
| Occ 46 | 0.205 | 2.05 | 0.009 | 0.400 | 0.005 |
| Occ 55 | 0.475 | 4.69 | 0.277 | 0.674 | 0.006 |
| Occ 57 | 0.264 | 2.54 | 0.060 | 0.468 | 0.006 |
| Occ 58 | -0.176 | -3.80 | -0.267 | -0.086 | 0.028 |
| Occ 59 | -0.259 | -3.98 | -0.386 | -0.131 | 0.015 |
| Occ 60 | 0.134 | 3.47 | 0.058 | 0.210 | 0.065 |
| Occ 61 | -0.092 | -2.18 | -0.174 | -0.009 | 0.038 |
| Occ 62 | -0.124 | -2.32 | -0.229 | -0.019 | 0.026 |
| Occ 63 | -0.198 | -4.18 | -0.290 | -0.105 | 0.029 |
| Occ 64 | -0.104 | -2.12 | -0.201 | -0.008 | 0.025 |
| Occ 65 | 0.233 | 4.08 | 0.121 | 0.344 | 0.019 |
| Occ 66 | 0.303 | 3.51 | 0.134 | 0.473 | 0.008 |
| Occ 68 | -0.254 | -1.65 | -0.555 | 0.047 | 0.003 |
| Occ 70 | 0.105 | 1.76 | -0.012 | 0.222 | 0.017 |
| *Occ 72* | *-0.055* | *-0.80* | *-0.188* | *0.079* | 0.013 |
| Occ 73 | -0.595 | -5.80 | -0.795 | -0.394 | 0.005 |
| *Occ 84* | *0.064* | *0.16* | *-0.698* | *0.825* | 0.001 |
| *AFQT missing* | *0.041* | *1.60* | *-0.009* | *0.091* | .179 |
| Constant | -9.593 | -45.06 | -10.010 | -9.175 | 1.000 |

| | |
|---|---|
| Average reenlistment rate | 0.658 |
| Number of observations | 94,303 |
| Chi square | 12,232 |

a. Variables that are not statistically significant at the 1-percent level are shown in italics.
b. The omitted occupational field is 03.

Table 18. Logistic regression estimates for Zone B reenlistment decisions, without occfield dummy variables: FY85-03[a]

| Variable | Coefficient | t-statistic | 95% confidence interval | | Mean value |
|---|---|---|---|---|---|
| SRB multiple | 0.275 | 30.55 | 0.257 | 0.292 | 0.448 |
| Lump-sum SRB | 0.138 | 2.40 | 0.025 | 0.250 | 0.027 |
| Mil to civ pay ratio | 2.192 | 13.32 | 1.869 | 2.514 | 1.056 |
| Unemp rate 25-34 males | 2.676 | 4.11 | 1.399 | 3.953 | 0.056 |
| Male | 0.053 | 1.72 | -0.007 | 0.113 | 0.940 |
| Black | 0.662 | 35.17 | 0.625 | 0.699 | 0.232 |
| Hispanic | 0.301 | 11.12 | 0.248 | 0.354 | 0.085 |
| AFQT ge 50 | -0.275 | -14.93 | -0.311 | -0.239 | 0.582 |
| Dependents or married | 0.534 | 30.47 | 0.500 | 0.569 | 0.796 |
| Drawdown 92-97 | -0.107 | -5.72 | -0.143 | -0.070 | 0.309 |
| Relative rank | 6.920 | 75.98 | 6.741 | 7.098 | 0.996 |
| *AFQT missing* | *0.018* | *0.71* | *-0.032* | *0.068* | *0.179* |
| Constant | -9.201 | -43.94 | -9.612 | -8.791 | 1.000 |
| | | | | | |
| Average reenlistment rate | 0.658 | | | | |
| Number of observations | 94,303 | | | | |
| Chi square | 11,360 | | | | |

a. Variables that are not statistically significant at the 1-percent level are shown in italics.

# Appendix C: Zone C logistic regressions

Table 19. Logistic regression estimates for Zone C reenlistment decisions: FY85-03[a]

| Variables | Coefficients | t-statistic | 95% confidence interval | | Mean value |
|---|---|---|---|---|---|
| SRB multiple | 0.244 | 7.95 | 0.184 | 0.304 | 0.168 |
| *Lump-sum SRB* | *0.153* | *1.13* | *-0.112* | *0.417* | 0.023 |
| Mil to civ pay ratio | 2.361 | 6.31 | 1.628 | 3.094 | 1.059 |
| Unemp rate 25-34 males | 13.209 | 11.41 | 10.939 | 15.478 | 0.055 |
| Male | 0.371 | 6.30 | 0.256 | 0.487 | 0.951 |
| Black | 0.229 | 7.28 | 0.167 | 0.291 | 0.259 |
| Hispanic | 0.234 | 4.66 | 0.136 | 0.333 | 0.081 |
| AFQT ge 50 | -0.176 | -4.86 | -0.248 | -0.105 | 0.414 |
| Dependents or married | 0.355 | 8.91 | 0.277 | 0.433 | 0.903 |
| Drawdown 92-97 | -0.544 | -16.65 | -0.608 | -0.480 | 0.361 |
| Relative rank | 16.147 | 85.87 | 15.779 | 16.516 | 0.993 |
| Occ 02[b] | -1.054 | -10.51 | -1.250 | -0.857 | 0.020 |
| Occ 03 | -0.345 | -5.76 | -0.462 | -0.228 | 0.115 |
| Occ 04 | -0.202 | -2.02 | -0.399 | -0.006 | 0.027 |
| Occ 05 | -0.774 | -2.00 | -1.532 | -0.015 | 0.001 |
| Occ 06 | -0.401 | -6.00 | -0.533 | -0.270 | 0.069 |
| Occ 08 | -0.317 | -3.14 | -0.515 | -0.119 | 0.024 |
| Occ 11 | -0.253 | -2.54 | -0.448 | -0.058 | 0.020 |
| Occ 13 | -0.211 | -2.71 | -0.364 | -0.058 | 0.046 |
| Occ 18 | -0.310 | -2.46 | -0.557 | -0.063 | 0.014 |
| Occ 21 | -0.328 | -3.63 | -0.506 | -0.151 | 0.026 |
| Occ 23 | -0.292 | -2.38 | -0.533 | -0.051 | 0.013 |
| Occ 26 | -0.762 | -6.25 | -1.001 | -0.523 | 0.013 |
| Occ 28 | -0.701 | -7.85 | -0.876 | -0.526 | 0.029 |
| *Occ 30* | *0.008* | *0.11* | *-0.126* | *0.141* | 0.074 |
| Occ 31 | 0.316 | 1.68 | -0.054 | 0.686 | 0.005 |
| Occ 33 | -0.205 | -2.16 | -0.391 | -0.019 | 0.025 |
| *Occ 34* | *0.099* | *0.72* | *-0.169* | *0.367* | 0.013 |
| *Occ 35* | *0.069* | *1.03* | *-0.063* | *0.201* | 0.071 |

Table 19. Logistic regression estimates for Zone C reenlistment decisions: FY85-03[a] (continued)

| Variables | Coefficients | t-statistic | 95% confidence interval | | Mean value |
|---|---|---|---|---|---|
| *Occ 41* | *0.110* | *0.41* | *-0.413* | *0.632* | 0.004 |
| Occ 43 | -0.845 | -4.69 | -1.199 | -0.492 | 0.004 |
| Occ 44 | -0.390 | -2.35 | -0.715 | -0.065 | 0.006 |
| Occ 46 | -0.102 | -0.66 | -0.403 | 0.199 | 0.007 |
| Occ 55 | -0.307 | -1.56 | -0.691 | 0.078 | 0.005 |
| Occ 57 | -0.530 | -3.10 | -0.864 | -0.195 | 0.006 |
| Occ 58 | -0.395 | -4.41 | -0.571 | -0.220 | 0.027 |
| Occ 59 | -0.531 | -4.36 | -0.771 | -0.292 | 0.015 |
| Occ 60 | -0.270 | -3.76 | -0.410 | -0.129 | 0.076 |
| Occ 61 | -0.289 | -3.59 | -0.447 | -0.131 | 0.041 |
| *Occ 62* | *-0.126* | *-1.44* | *-0.296* | *0.045* | 0.032 |
| Occ 63 | -0.466 | -5.13 | -0.645 | -0.288 | 0.028 |
| Occ 64 | -0.334 | -3.60 | -0.516 | -0.152 | 0.024 |
| Occ 65 | -0.194 | -1.82 | -0.403 | -0.014 | 0.019 |
| *Occ 66* | *-0.123* | *-0.95* | *-0.377* | *0.131* | 0.010 |
| Occ 68 | -0.860 | -3.10 | -1.403 | -0.317 | 0.002 |
| *Occ 70* | *-0.079* | *-0.70* | *-0.299* | *0.142* | 0.018 |
| Occ 72 | -0.678 | -5.57 | -0.916 | -0.439 | 0.014 |
| Occ 73 | -1.132 | -5.91 | -1.508 | -0.757 | 0.004 |
| *Occ 84* | *-0.225* | *- 0.63* | *-0.922* | *0.472* | 0.004 |
| AFQT missing | 0.206 | 4.57 | 0.118 | 0.295 | 0.400 |
| Constant | -17.547 | -38.09 | -18.449 | -16.644 | 1.000 |
| | | | | | |
| Average reenlistment rate | 0.824 | | | | |
| Number observations | 54,334 | | | | |
| Chi square | 11,030 | | | | |

a. Variables that are not statistically significant at the 1-percent level are shown in italics.

b. The omitted occupational field is 01.

Table 20. Logistic regression estimates for Zone C reenlistment decisions, without occfield dummy variables: FY85-03[a]

| Variables | Coefficient | t-statistic | 95% confidence interval | | Mean value |
|---|---|---|---|---|---|
| SRB multiple | 0.155 | 5.24 | 0.097 | 0.213 | 0.168 |
| *Lump-sum SRB* | *0.115* | *0.87* | *-0.146* | *0.376* | 0.023 |
| Mil to civ pay ratio | 2.245 | 6.08 | 1.521 | 2.969 | 1.059 |
| Unemp rate 25-34 males | 13.279 | 11.55 | 11.025 | 15.532 | 0.055 |
| Male | 0.272 | 4.82 | 0.162 | 0.383 | 0.951 |
| Black | 0.305 | 9.95 | 0.245 | 0.365 | 0.259 |
| Hispanic | 0.296 | 5.93 | 0.198 | 0.393 | 0.081 |
| AFQT ge 50 | -0.237 | -6.71 | -0.306 | -0.168 | 0.414 |
| Dependents or married | 0.377 | 9.53 | 0.300 | 0.455 | 0.903 |
| Drawdown 92-97 | -0.567 | -17.53 | -0.630 | -0.503 | 0.361 |
| Relative rank | 15.769 | 85.72 | 15.409 | 16.130 | 0.993 |
| AFQT missing | 0.163 | 3.65 | 0.075 | 0.250 | 0.400 |
| Constant | -17.225 | -38.05 | -18.112 | -16.337 | 1.000 |
| | | | | | |
| Mean reenlistment rate | 0.824 | | | | |
| Number observations | 54,334 | | | | |
| Chi square | 10,707 | | | | |

a. Variables that are not statistically significant at the 1-percent level are shown in italics.

# Appendix D: Evaluation of the EAS population

This appendix details the process by which the strength planner evaluated the EAS population for the next fiscal year.

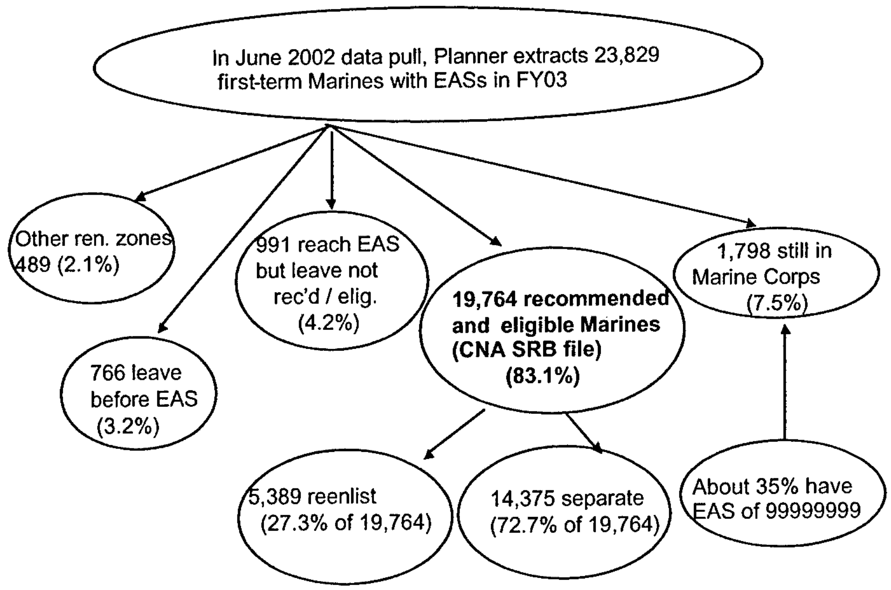
Major Ross provided us with a June 2002 data pull for the Zone A EAS population. In that data pull, he extracted the records for all Marines with EASs in FY03. We then looked at what happened to these 23,829 Marines. We expected to find them in four categories:

- Attrited prior to the EAS
- Separated at EAS (not recommended or eligible to reenlist)
- Separated at EAS (recommended and eligible to reenlist)
- Reenlisted.

In addition to these four categories, we found a relatively large number of these Marines who were still in the Corps. FY03 may be unusual, however, because of the war and stop-loss. Figure 14 shows our findings.

Of those with EASs in FY03, only 85 percent of them really were in the "population of interest," namely they could reenlist or leave. This percentage is smaller than expected, but we have not been able to determine another way the SRB planner can do the planning for the next fiscal year's SRBs. Waiting until later in the year to extract the sample is not possible because the SRBs are announced just before the start of the fiscal year.

Figure 14. The Zone A EAS population for 2003[a]




a. We believe that an EAS of 99999999 indicates stop-loss (i.e., Marine must remain in Corps until stop-loss is lifted).

# Appendix E: Predicted reenlistment rates for Zone B and Zone C

Table 21. Zone B predicted reenlistment percentages for 2003, by SRB level[a]

| | SRB multiple | | | | | |
|---|---|---|---|---|---|---|
| Occfield | 0 | 1 | 2 | 3 | 4 | 5 |
| 01 | 79.9 | 87.8 | 90.8 | 93.1 | 94.9 | 96.2 |
| 02 | 68.7 | 79.9 | 84.5 | 88.2 | 91.2 | 93.4 |
| 03 | 69.9 | 76.2 | 81.5 | 85.8 | 89.2 | 91.9 |
| 04 | 76.7 | 85.6 | 89.1 | 91.8 | 93.9 | 95.5 |
| 05 | 76.7 | 85.6 | 89.1 | 91.8 | 93.9 | 95.5 |
| 06 | 69.3 | 80.3 | 84.9 | 88.5 | 91.4 | 93.6 |
| 08 | 69.9 | 80.7 | 85.2 | 88.8 | 91.6 | 93.7 |
| 11 | 76.5 | 85.5 | 89.0 | 91.7 | 93.9 | 95.5 |
| 13 | 74.7 | 84.2 | 88.0 | 91.0 | 93.3 | 95.0 |
| 18 | 68.6 | 79.8 | 84.5 | 88.2 | 91.1 | 93.4 |
| 21 | 74.2 | 83.8 | 87.7 | 90.7 | 93.1 | 94.9 |
| 23 | 77.4 | 86.1 | 89.5 | 92.1 | 94.1 | 95.7 |
| 26 | 68.1 | 79.4 | 84.1 | 87.9 | 90.9 | 93.2 |
| 28 | 65.4 | 77.3 | 82.4 | 86.6 | 89.8 | 92.4 |
| 30 | 78.8 | 87.0 | 90.2 | 92.7 | 94.6 | 96.0 |
| 31 | 79.0 | 87.2 | 90.3 | 92.8 | 94.6 | 96.0 |
| 33 | 74.0 | 83.7 | 87.6 | 90.6 | 93.0 | 94.8 |
| 34 | 77.5 | 86.2 | 89.5 | 92.2 | 94.2 | 95.7 |
| 35 | 74.1 | 83.8 | 87.6 | 90.7 | 93.1 | 94.8 |
| 41 | 82.6 | 89.6 | 92.2 | 94.2 | 95.7 | 96.8 |
| 43 | 69.0 | 80.1 | 84.7 | 88.4 | 91.2 | 93.5 |
| 44 | 77.5 | 86.1 | 89.5 | 92.1 | 94.2 | 95.7 |
| 46 | 74.1 | 83.8 | 87.6 | 90.7 | 93.1 | 94.8 |
| 55 | 78.9 | 87.1 | 90.3 | 92.7 | 94.6 | 96.0 |
| 57 | 75.2 | 84.6 | 88.3 | 91.2 | 93.4 | 95.1 |
| 58 | 66.1 | 77.9 | 82.9 | 86.9 | 90.1 | 92.6 |
| 59 | 64.2 | 76.4 | 81.7 | 86.0 | 89.4 | 92.0 |

Table 21. Zone B predicted reenlistment percentages for 2003, by SRB level[a] (continued)

| Occfield | SRB multiple | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 |
| 60 | 72.7 | 82.8 | 86.9 | 90.1 | 92.6 | 94.5 |
| 61 | 68.0 | 79.3 | 84.1 | 87.9 | 90.9 | 93.2 |
| 62 | 67.3 | 78.8 | 83.6 | 87.5 | 90.6 | 93.0 |
| 63 | 65.6 | 77.5 | 82.6 | 86.7 | 90.0 | 92.5 |
| 64 | 67.7 | 79.1 | 83.9 | 87.7 | 90.8 | 93.1 |
| 65 | 74.6 | 84.1 | 87.9 | 90.9 | 93.2 | 95.0 |
| 66 | 75.9 | 85.1 | 88.7 | 91.5 | 93.7 | 95.3 |
| 68 | 64.4 | 76.5 | 81.8 | 86.0 | 89.4 | 92.1 |
| 70 | 72.1 | 82.4 | 86.5 | 89.8 | 92.4 | 94.3 |
| 72 | 68.8 | 79.9 | 84.5 | 88.3 | 91.2 | 93.4 |
| 73 | 56.2 | 69.9 | 76.1 | 81.4 | 85.8 | 89.2 |
| 84 | 71.3 | 81.8 | 86.0 | 89.4 | 92.1 | 94.1 |

a. With the 2003 values of 1.21 for the military-to-civilian pay ratio and .062 for the male 25-34 year unemployment rate, predicted reenlistment percentages are found for each occfield and SRB level. This is done by using the mean values of the male, black, Hispanic, AFQT ge 50, dependents or married, and relative rank variables. The constant is set to one, the drawdown variable is set to zero, and SRB lump-sum variable is set to one for SRB multiples greater than zero.

Table 22. Zone C predicted reenlistment percentages for 2003, by SRB level[a]

| Occfield | SRB multiple 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 01 | 94.8 | 96.4 | 97.2 | 97.8 | 98.3 | 98.6 |
| 02 | 86.4 | 90.4 | 92.3 | 93.9 | 95.1 | 96.2 |
| 03 | 92.8 | 95.0 | 96.1 | 96.9 | 97.5 | 98.1 |
| 04 | 93.7 | 95.7 | 96.6 | 97.3 | 97.9 | 98.3 |
| 05 | 89.4 | 92.6 | 94.1 | 95.3 | 96.3 | 97.1 |
| 06 | 92.4 | 94.8 | 95.9 | 96.7 | 97.4 | 98.0 |
| 08 | 93.0 | 95.2 | 96.2 | 97.0 | 97.6 | 98.1 |
| 11 | 93.4 | 95.5 | 96.4 | 97.2 | 97.8 | 98.2 |
| 13 | 93.6 | 95.6 | 96.5 | 97.3 | 97.8 | 98.3 |
| 18 | 93.0 | 95.2 | 96.2 | 97.0 | 97.6 | 98.1 |
| 21 | 92.9 | 95.1 | 96.1 | 96.9 | 97.6 | 98.1 |
| 23 | 93.1 | 95.3 | 96.3 | 97.0 | 97.7 | 98.2 |
| 26 | 89.5 | 92.7 | 94.2 | 95.4 | 96.3 | 97.1 |
| 28 | 90.0 | 93.1 | 94.5 | 95.6 | 96.5 | 97.3 |
| 30 | 94.8 | 96.5 | 97.2 | 97.8 | 98.3 | 98.6 |
| 31 | 96.1 | 97.4 | 97.9 | 98.4 | 98.7 | 99.0 |
| 33 | 93.7 | 95.7 | 96.6 | 97.3 | 97.9 | 98.3 |
| 34 | 95.3 | 96.8 | 97.4 | 98.0 | 98.4 | 98.8 |
| 35 | 95.1 | 96.7 | 97.4 | 97.9 | 98.4 | 98.7 |
| 41 | 95.3 | 96.8 | 97.5 | 98.0 | 98.4 | 98.8 |
| 43 | 88.6 | 92.1 | 93.7 | 95.0 | 96.0 | 96.9 |
| 44 | 92.5 | 94.8 | 95.9 | 96.8 | 97.4 | 98.0 |
| 46 | 94.3 | 96.1 | 96.9 | 97.5 | 98.1 | 98.5 |
| 55 | 93.0 | 95.2 | 96.2 | 97.0 | 97.6 | 98.1 |
| 57 | 91.5 | 94.1 | 95.3 | 96.3 | 97.1 | 97.7 |
| 58 | 92.5 | 94.8 | 95.9 | 96.7 | 97.4 | 98.0 |
| 59 | 91.4 | 94.1 | 95.3 | 96.3 | 97.1 | 97.7 |
| 60 | 93.3 | 95.4 | 96.3 | 97.1 | 97.7 | 98.2 |
| 61 | 93.2 | 95.3 | 96.3 | 97.1 | 97.7 | 98.2 |
| 62 | 94.1 | 96.0 | 96.8 | 97.5 | 98.0 | 98.4 |
| 63 | 91.9 | 94.4 | 95.6 | 96.5 | 97.2 | 97.8 |
| 64 | 92.9 | 95.1 | 96.1 | 96.9 | 97.6 | 98.1 |
| 65 | 93.7 | 95.7 | 96.6 | 97.3 | 97.9 | 98.3 |
| 66 | 94.1 | 96.0 | 96.8 | 97.5 | 98.0 | 98.4 |
| 68 | 88.5 | 92.0 | 93.6 | 94.9 | 96.0 | 96.8 |
| 70 | 94.4 | 96.2 | 97.0 | 97.6 | 98.1 | 98.5 |
| 72 | 90.2 | 93.2 | 94.6 | 95.7 | 96.6 | 97.3 |

Table 22. Zone C predicted reenlistment percentages for 2003, by SRB level[a] (continued)

| Occfield | SRB multiple 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 73 | 85.4 | 89.7 | 91.7 | 93.4 | 94.8 | 95.9 |
| 84 | 93.6 | 95.6 | 96.5 | 97.2 | 97.8 | 98.3 |

a. With the 2003 values of 1.20 for the military-to-civilian pay ratio and .062 for the male 25-34 year unemployment rate, predicted reenlistment percentages are found for each occfield and SRB level. This is done by using the mean values of the male, black, Hispanic, AFQT ge 50, dependents or married, and relative rank variables. The constant is set to one, the drawdown variable is set to zero, and SRB lump-sum variable is set to one for SRB multiples greater than zero.

# Appendix F: Marginal cost of an SRB reenlistment in Zone A

Table 23. Marginal cost of an SRB reenlistment in Zone A

| | Bonus multiple change | | | | |
|---|---|---|---|---|---|
| Occfield | 0 to 1 | 1 to 2 | 2 to 3 | 3 to 4 | 4 to 5 |
| 01 | $18,465 | $64,419 | $85,002 | $111,131 | $145,069 |
| 02 | $15,849 | $51,322 | $66,560 | $85,161 | $108,499 |
| 03 | $13,780 | $40,965 | $51,974 | $64,622 | $79,577 |
| 04 | $15,653 | $50,340 | $65,177 | $83,213 | $105,757 |
| 05 | $15,175 | $47,950 | $61,811 | $78,473 | $99,082 |
| 06 | $14,702 | $45,581 | $58,474 | $73,775 | $92,466 |
| 08 | $14,259 | $43,359 | $55,345 | $69,369 | $86,262 |
| 11 | $15,021 | $47,177 | $60,722 | $76,940 | $96,922 |
| 13 | $15,103 | $47,589 | $61,303 | $77,758 | $98,074 |
| 18 | $14,139 | $42,761 | $54,504 | $68,184 | $84,593 |
| 21 | $14,841 | $46,275 | $59,452 | $75,152 | $94,404 |
| 23 | $14,998 | $47,061 | $60,559 | $76,711 | $96,600 |
| 26 | $14,269 | $43,413 | $55,422 | $69,476 | $86,413 |
| 28 | $13,983 | $41,979 | $53,403 | $66,633 | $82,409 |
| 30 | $17,095 | $57,562 | $75,346 | $97,533 | $125,922 |
| 31 | $17,459 | $59,384 | $77,912 | $101,147 | $131,011 |
| 33 | $15,448 | $49,313 | $63,730 | $81,177 | $102,888 |
| 34 | $17,759 | $60,886 | $80,027 | $104,125 | $135,204 |
| 35 | $15,032 | $47,229 | $60,796 | $77,045 | $97,070 |
| 41[a] | $37,858 | $161,521 | $221,738 | $303,679 | $416,210 |
| 43 | $15,398 | $49,062 | $63,377 | $80,679 | $102,188 |
| 44 | $18,787 | $66,032 | $87,273 | $114,328 | $149,572 |
| 46 | $16,826 | $56,213 | $73,447 | $94,859 | $122,155 |
| 55[b] | $17,622 | $60,200 | $79,061 | $102,765 | $133,289 |
| 57 | $15,976 | $51,958 | $67,455 | $86,422 | $110,275 |
| 58 | $14,752 | $45,828 | $58,822 | $74,265 | $93,156 |
| 59 | $14,485 | $44,492 | $56,942 | $71,617 | $89,427 |

Table 23. Marginal cost of an SRB reenlistment in Zone A (continued)

| Occfield | Bonus multiple change 0 to 1 | 1 to 2 | 2 to 3 | 3 to 4 | 4 to 5 |
|---|---|---|---|---|---|
| 60 | $14,997 | $47,057 | $60,553 | $76,703 | $96,588 |
| 61 | $14,403 | $44,084 | $56,366 | $70,807 | $88,286 |
| 62 | $13,843 | $41,278 | $52,415 | $65,243 | $80,451 |
| 63 | $14,275 | $43,443 | $55,464 | $69,536 | $86,496 |
| 64 | $14,276 | $43,449 | $55,472 | $69,547 | $86,512 |
| 65 | $15,216 | $48,151 | $62,094 | $78,872 | $99,643 |
| 66 | $16,932 | $56,744 | $74,194 | $95,911 | $123,637 |
| 68 | $15,251 | $48,328 | $62,343 | $79,223 | $100,137 |
| 70 | $15,247 | $48,306 | $62,312 | $79,179 | $100,076 |
| 72 | $14,226 | $43,197 | $55,118 | $69,049 | $85,811 |
| 73 | $15,127 | $47,710 | $61,472 | $77,997 | $98,410 |

a. No bonuses are given in occfield 41 (Marine Corps Exchange).
b. No bonuses are given in occfield 55 (Music).

# Appendix G: Zone A lateral move costs

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 0121 | Personnel Clerk | 71 | $12,141 | 1.00 | $12,141 | $12,141 | $24,282 | $18,465 |
| 0151 | Administrative Clerk | 70 | $11,970 | 1.00 | $11,970 | $11,970 | $23,940 | $18,465 |
| 0161 | Postal Clerk | 59 | $10,089 | 0.93 | $10,848 | $10,089 | $20,937 | $18,465 |
| 0231 | Intelligence Specialist | 148 | $25,308 | 0.92 | $27,509 | $25,308 | $52,817 | $15,849 |
| 0261 | Geographic Intelligence specialist | 320 | $54,720 | 0.90 | $60,800 | $54,720 | $115,520 | $15,849 |
| 0311 | Rifleman | 72 | $12,312 | 0.95 | $12,960 | $12,312 | $25,272 | $13,780 |
| 0313 | LAV Crewman | 126 | $21,546 | 0.90 | $23,940 | $21,546 | $45,486 | $13,780 |
| 0321 | Reconnaissance Man | 322 | $55,062 | 0.80 | $68,828 | $55,062 | $123,890 | $13,780 |
| 0331 | Machinegunner | 79 | $13,509 | 0.95 | $14,220 | $13,509 | $27,729 | $13,780 |
| 0341 | Mortarman | 79 | $13,509 | 0.95 | $14,220 | $13,509 | $27,729 | $13,780 |
| 0351 | Assault Man | 77 | $13,167 | 0.95 | $13,860 | $13,167 | $27,027 | $13,780 |
| 0352 | Anti-Tank/Assault Guided Missile | 71 | $12,141 | 0.95 | $12,780 | $12,141 | $24,921 | $13,780 |
| 0411 | Maintenance Management Specialist | 87 | $14,877 | 1.00 | $14,877 | $14,877 | $29,754 | $15,653 |
| 0431 | Log/Embark & Combat Support Specialist | 89 | $15,219 | 1.00 | $15,219 | $15,219 | $30,438 | $15,653 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 0451 | Air Delivery Specialist | 152 | $25,992 | 0.84 | $30,954 | $25,992 | $56,946 | $15,653 |
| 0481 | Landing Support Specialist | 118 | $20,178 | 1.00 | $20,178 | $20,178 | $40,356 | $15,653 |
| 0511 | MAGTF Planning | 100 | $17,100 | 1.00 | $17,100 | $17,100 | $34,200 | $15,175 |
| 0612 | Field Wireman | 97 | $16,587 | 0.99 | $16,771 | $16,587 | $33,358 | $14,702 |
| 0613 | Construction Wireman | 186 | $31,806 | 0.90 | $35,340 | $31,806 | $67,146 | $14,702 |
| 0614 | ULCS/Operator/ Maintainer | 124 | $21,204 | 0.95 | $22,344 | $21,204 | $43,548 | $14,702 |
| 0621 | Field Radio Operator | 96 | $16,416 | 0.98 | $16,802 | $16,416 | $33,218 | $14,702 |
| 0622 | Mobile Multichannel Equip Operator | 137 | $23,427 | 0.94 | $24,994 | $23,427 | $48,421 | $14,702 |
| 0624 | High Frequenc Comm Central Operator | 151 | $25,821 | Imputed | $26,348 | $25,821 | $52,169 | $14,702 |
| 0626 | Fleet SATCOM Terminal Operator | 244 | $41,724 | 0.99 | $42,286 | $41,724 | $84,010 | $14,702 |
| 0627 | Ground Mobile Forces SATCOM Operator | 186 | $31,806 | 0.94 | $33,934 | $31,806 | $65,740 | $14,702 |
| 0811 | Field Artillery Cannoneer | 67 | $11,457 | 0.95 | $12,004 | $11,457 | $23,461 | $14,259 |
| 0842 | Field Artillery Radar Operator | 104 | $17,784 | 0.99 | $17,998 | $17,784 | $35,782 | $14,259 |
| 0844 | Field Artillery Fire Control Man | 99 | $16,929 | 0.89 | $19,021 | $16,929 | $35,950 | $14,259 |
| 0847 | Artillery Meteorological Man | 85 | $14,535 | 0.96 | $15,093 | $14,535 | $29,628 | $14,259 |
| 0861 | Fire Support Man | 93 | $15,903 | 0.93 | $17,100 | $15,903 | $33,003 | $14,259 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 1141 | Electrician | 112 | $19,152 | 0.97 | $19,845 | $19,152 | $38,997 | $15,021 |
| 1142 | Elec Equip Repair | 166 | $28,386 | 0.98 | $29,114 | $28,386 | $57,500 | $15,021 |
| 1161 | Refrigeration Mechanic | 86 | $14,706 | 0.93 | $15,898 | $14,706 | $30,604 | $15,021 |
| 1171 | Hygiene Equipment Operator | 113 | $19,323 | 0.96 | $20,206 | $19,323 | $39,529 | $15,021 |
| 1181 | Fabric Repair Specialist | 103 | $17,613 | 0.95 | $18,591 | $17,613 | $36,204 | $15,021 |
| 1316 | Metal Worker | 137 | $23,427 | 0.96 | $24,449 | $23,427 | $47,876 | $15,103 |
| 1341 | Engineer Equipment Mechanic | 78 | $13,338 | 0.91 | $14,633 | $13,338 | $27,971 | $15,103 |
| 1345 | Engineer Equipment Operator | 98 | $16,758 | 0.94 | $17,773 | $16,758 | $34,531 | $15,103 |
| 1361 | Engineer Specialist | 173 | $29,583 | 0.90 | $32,870 | $29,583 | $62,453 | $15,103 |
| 1371 | Combat Engineer | 80 | $13,680 | 0.98 | $13,959 | $13,680 | $27,639 | $15,103 |
| 1391 | Bulk Fuel Specialist | 78 | $13,338 | 0.98 | $13,676 | $13,338 | $27,014 | $15,103 |
| 1812 | M1A1 Tank Crewman | 114 | $19,494 | 0.96 | $20,266 | $19,494 | $39,760 | $14,139 |
| 1833 | Assault Amphibious Veh Crew | 97 | $16,587 | 0.95 | $17,519 | $16,587 | $34,106 | $14,139 |
| 2111 | Small Arms Repairer/ Technician | 115 | $19,665 | 0.93 | $21,145 | $19,665 | $40,810 | $14,841 |
| 2131 | Towed Artillery Sys-tems Technician | 135 | $23,085 | 0.92 | $25,092 | $23,085 | $48,177 | $14,841 |
| 2141 | Assault Amphibian Vehicle Repairer/Tech | 157 | $26,847 | 0.95 | $28,260 | $26,847 | $55,107 | $14,841 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 2146 | Main Battle Tank Repairer Technician | 140 | $23,940 | 0.97 | $24,680 | $23,940 | $48,620 | $14,841 |
| 2147 | Light Armored Vehicle (LAV) Repairer | 107 | $18,297 | 0.91 | $19,999 | $18,297 | $38,296 | $14,841 |
| 2161 | Repair Shop Machinist | 136 | $23,256 | 0.97 | $23,975 | $23,256 | $47,231 | $14,841 |
| 2171 | Electro-Optical Ord Repair | 205 | $35,055 | 1.00 | $35,055 | $35,055 | $70,110 | $14,841 |
| 2311 | Ammunition Technician | 69 | $11,799 | 0.94 | $12,552 | $11,799 | $24,351 | $14,998 |
| 2621 | Electronic Intelligence | 218 | $37,278 | 0.95 | $39,240 | $37,278 | $76,518 | $14,269 |
| 2631 | ELINT Intercept | 138 | $23,598 | 0.95 | $24,840 | $23,598 | $48,438 | $14,269 |
| 2651 | Special Intelligence | 161 | $27,531 | 0.95 | $28,980 | $27,531 | $56,511 | $14,269 |
| 2671 | Arabic Cryptologic | 712 | $121,752 | 0.85 | $143,238 | $121,752 | $264,990 | $14,269 |
| 2673 | | 758 | $129,618 | Imputed | $132,263 | $129,618 | $261,881 | $14,269 |
| 2674 | Spanish Cryptologic | 511 | $87,381 | 0.85 | $102,801 | $87,381 | $190,182 | $14,269 |
| 2676 | Russian Cryptologic | 614 | $104,994 | 0.85 | $123,522 | $104,994 | $228,516 | $14,269 |
| 2811 | Telephone Technician | 224 | $38,304 | Imputed | $39,086 | $38,304 | $77,390 | $13,983 |
| 2818 | Teletype and Tactical Office Machine | 226 | $38,646 | Imputed | $39,435 | $38,646 | $78,081 | $13,983 |
| 2822 | Electronic Switching Equipment Tech | 206 | $35,226 | 0.93 | $37,877 | $35,226 | $73,103 | $13,983 |
| 2823 | Technical Controller | 319 | $54,549 | Imputed | $55,662 | $54,549 | $110,211 | $13,983 |
| 2831,2832 | Microwave Equipment Repairman | 321 | $54,891 | 0.90 | $60,990 | $54,891 | $115,881 | $13,983 |
| 2841 | Ground Radio Repairer | 259 | $44,289 | Imputed | $45,193 | $44,289 | $89,482 | $13,983 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 2844,2862 | Ground Comm Org Repair | 312 | $53,352 | 0.98 | $54,441 | $53,352 | $107,793 | $13,983 |
| 2846 | Ground Radio Int Repair | 319 | $54,549 | 0.92 | $59,292 | $54,549 | $113,841 | $13,983 |
| 2847 | Telephone System | 367 | $62,757 | 0.92 | $68,214 | $62,757 | $130,971 | $13,983 |
| 2848 | Tact Remote Sensor Sys (TRSS) Maintainer | 310 | $53,010 | Imputed | $54,092 | $53,010 | $107,102 | $13,983 |
| 2871 | Test Measurement and Diagnostic Eq | 256 | $43,776 | 0.82 | $53,503 | $43,776 | $97,279 | $13,983 |
| 2881 | Communications | 250 | $42,750 | 0.92 | $46,467 | $42,750 | $89,217 | $13,983 |
| 2887 | Counter Mortar Radar Repairer | 201 | $34,371 | 0.90 | $38,190 | $34,371 | $72,561 | $13,983 |
| 3043 | Supply Admin & Opr Clerk | 63 | $10,773 | 1.00 | $10,773 | $10,773 | $21,546 | $17,095 |
| 3051 | Warehouse Clerk | 57 | $9,747 | 1.00 | $9,747 | $9,747 | $19,494 | $17,095 |
| 3052 | Packaging Specialist | 94 | $16,074 | 1.00 | $16,074 | $16,074 | $32,148 | $17,095 |
| 3112 | Traffic Management Specialist | 109 | $18,639 | 0.96 | $19,416 | $18,639 | $38,055 | $17,459 |
| 3381 | Food Service Specialist | 173 | $29,583 | 0.99 | $30,009 | $29,583 | $59,592 | $15,448 |
| 3432 | Finance Technician | 115 | $19,665 | 1.00 | $19,665 | $19,665 | $39,330 | $17,759 |
| 3451 | Fiscal/Budget Technician | 81 | $13,851 | 1.00 | $13,851 | $13,851 | $27,702 | $17,759 |
| 3521 | Organizational Auto Mech | 188 | $32,148 | 0.93 | $34,568 | $32,148 | $66,716 | $15,032 |
| 3531 | Motor Vehicle Operator | 73 | $12,483 | 0.99 | $12,636 | $12,483 | $25,119 | $15,032 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 3533 | Logistics Vehicle System Operator | 115 | $19,665 | 0.92 | $21,375 | $19,665 | $41,040 | $15,032 |
| 4341 | Combat Correspondent | 220 | $37,620 | 0.94 | $39,898 | $37,620 | $77,518 | $15,398 |
| 4421 | Legal Services Specialist | 110 | $18,810 | 0.95 | $19,800 | $18,810 | $38,610 | $18,787 |
| 4611 | Combat Illustrator | 56 | $9,576 | 0.99 | $9,673 | $9,576 | $19,249 | $16,826 |
| 4612 | Combat Lithographer | 168 | $28,728 | 1.00 | $28,728 | $28,728 | $57,456 | $16,826 |
| 4641 | Combat Photographer | 196 | $33,516 | 0.99 | $33,855 | $33,516 | $67,371 | $16,826 |
| 4671 | Combat Videographer | 182 | $31,122 | 0.99 | $31,436 | $31,122 | $62,558 | $16,826 |
| 5711 | Nuclear Biological and Chemical Defense | 164 | $28,044 | 0.91 | $30,818 | $28,044 | $58,862 | $15,976 |
| 5811,5821 | Military Police | 105 | $17,955 | 0.97 | $18,510 | $17,955 | $36,465 | $14,752 |
| 5831 | Correctional Specialist | 55 | $9,405 | 0.99 | $9,500 | $9,405 | $18,905 | $14,752 |
| 5937,5939 | Aviation Radio Repairer | 333 | $56,943 | 0.89 | $63,981 | $56,943 | $120,924 | $14,485 |
| 5942,5948 | Aviation Radar Repairer (AN/TPS-59) | 417 | $71,307 | 0.80 | $89,134 | $71,307 | $160,441 | $14,485 |
| 5952 | Air Traffic Control Nav Aide | 350 | $59,850 | 0.89 | $67,247 | $59,850 | $127,097 | $14,485 |
| 5953 | Air Traffic Control Radar Tech | 491 | $83,961 | 0.89 | $94,338 | $83,961 | $178,299 | $14,485 |
| 5954 | Air Traffic Control Comm | 422 | $72,162 | 0.89 | $81,081 | $72,162 | $153,243 | $14,485 |
| 5962,5974 | Tactical Data Sys Equip (TDSE) Repairer | 355 | $60,705 | 0.92 | $65,984 | $60,705 | $126,689 | $14,485 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 5963,5979 | Tact Air Operations Module Repairer | 297 | $50,787 | 0.92 | $55,203 | $50,787 | $105,990 | $14,485 |
| 6011 | Aircraft Mechanic-Trainee | 77 | $13,167 | Imputed | $13,436 | $13,167 | $26,603 | $14,997 |
| 6042 | IMRL Asset Manager | 127 | $21,717 | 0.95 | $22,750 | $21,717 | $44,467 | $14,997 |
| 6046 | Aircraft Maintenance Admin | 92 | $15,732 | 0.95 | $16,560 | $15,732 | $32,292 | $14,997 |
| 6048 | Flight Equipment Tech | 98 | $16,758 | 1.00 | $16,758 | $16,758 | $33,516 | $14,997 |
| 6051 | Aircraft Hydraulic/ Pneumatic Mechanic-Trainee | 105 | $17,955 | Imputed | $18,321 | $17,955 | $36,276 | $14,997 |
| 6062 | Aircraft Inter Level Hydr/Pneu Mechanic | 183 | $31,293 | 0.99 | $31,609 | $31,293 | $62,902 | $14,997 |
| 6071 | Aircraft Maint GSE Trainee | 162 | $27,702 | Imputed | $28,267 | $27,702 | $55,969 | $14,997 |
| 6072 | Aircraft Maint GSE Hydr/Pneu Mech | 285 | $48,735 | 0.94 | $51,846 | $48,735 | $100,581 | $14,997 |
| 6073 | Aircraft Maint GSE Tech | 277 | $47,367 | 0.97 | $48,832 | $47,367 | $96,199 | $14,997 |
| 6074 | Cryogenic Equipment Operator | 115 | $19,665 | 1.00 | $19,665 | $19,665 | $39,330 | $14,997 |
| 6081 | Aircraft Safety Equipment Mechanic Trainee | 89 | $15,219 | Imputed | $15,530 | $15,219 | $30,749 | $14,997 |
| 6092 | Aircraft Inter Level Mech | 135 | $23,085 | 0.99 | $23,318 | $23,085 | $46,403 | $14,997 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 6112 | Helicopter Mech, Ch-46 | 141 | $24,111 | 1.00 | $24,111 | $24,111 | $48,222 | $14,403 |
| 6113 | Helicopter Mech, Ch-53 | 115 | $19,665 | 1.00 | $19,665 | $19,665 | $39,330 | $14,403 |
| 6114 | Helicopter Mech, U/AH-1 | 107 | $18,297 | 0.99 | $18,482 | $18,297 | $36,779 | $14,403 |
| 6122 | Helicopter Power Plants Mech, T-58 | 120 | $20,520 | 1.00 | $20,520 | $20,520 | $41,040 | $14,403 |
| 6123 | Helicopter Power Plants Mech, T-64 | 140 | $23,940 | 1.00 | $23,940 | $23,940 | $47,880 | $14,403 |
| 6124 | Helicopter Power Plants Mech, T-53 | 139 | $23,769 | 1.00 | $23,769 | $23,769 | $47,538 | $14,403 |
| 6132 | Helicopter Dynamics Component Mechanic | 88 | $15,048 | 1.00 | $15,048 | $15,048 | $30,096 | $14,403 |
| 6151 | Helicopter/Tiltrotor Air Mechanic | 79 | $13,509 | Imputed | $13,785 | $13,509 | $27,294 | $14,403 |
| 6152 | Helicopter Airframe Mech Ch-46 | 195 | $33,345 | 1.00 | $33,345 | $33,345 | $66,690 | $14,403 |
| 6153 | Helicopter Airframe Mech Ch-53 | 184 | $31,464 | 0.99 | $31,782 | $31,464 | $63,246 | $14,403 |
| 6154 | Helicopter Airframe Mech A/UH-1 | 144 | $24,624 | 0.99 | $24,873 | $24,624 | $49,497 | $14,403 |
| 6172 | Helicopter Crew Chief Ch-46 | 326 | $55,746 | 0.75 | $74,328 | $55,746 | $130,074 | $14,403 |
| 6173 | Helicopter Crew Chief Ch-53A/D | 284 | $48,564 | 0.77 | $63,070 | $48,564 | $111,634 | $14,403 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 6174 | Helicopter Crew Chief UH-1 | 288 | $49,248 | 0.60 | $82,080 | $49,248 | $131,328 | $14,403 |
| 6211 | Fixed Wing Aircraft Mech Trainee | 75 | $12,825 | Imputed | $13,087 | $12,825 | $25,912 | $13,843 |
| 6212 | Fixed Wing Aircraft Mechanic AV-8/TAV-8 | 162 | $27,702 | 1.00 | $27,702 | $27,702 | $55,404 | $13,843 |
| 6213 | Fixed Wing Aircraft Mechanic EA-6 | 126 | $21,546 | 1.00 | $21,546 | $21,546 | $43,092 | $13,843 |
| 6214 | Unmanned Aerial Veh Tech | 217 | $37,107 | 1.00 | $37,107 | $37,107 | $74,214 | $13,843 |
| 6216 | Fixed Wing Aircraft Mechanic KC-130 | 177 | $30,267 | 0.99 | $30,573 | $30,267 | $60,840 | $13,843 |
| 6217 | Fixed Wing Aircraft Mechanic F/A-18 | 104 | $17,784 | 0.99 | $17,964 | $17,784 | $35,748 | $13,843 |
| 6222 | Fixed Wing Aircraft F402 | 199 | $34,029 | 0.94 | $36,059 | $34,029 | $70,088 | $13,843 |
| 6223 | Fixed Wing Aircraft Power Plants J-52 | 100 | $17,100 | 0.96 | $17,813 | $17,100 | $34,913 | $13,843 |
| 6226 | Fixed-Wing Air Power Pland Mechanic (T-56) | 129 | $22,059 | 1.00 | $22,059 | $22,059 | $44,118 | $13,843 |
| 6227 | Fixed-Wing Air Power Plant Mechanic F-404 | 123 | $21,033 | 0.99 | $21,245 | $21,033 | $42,278 | $13,843 |
| 6251 | Fixed Wing Airframe Mechanic Trainee | 95 | $16,245 | Imputed | $16,577 | $16,245 | $32,822 | $13,843 |
| 6252 | Fixed Wing Airframe Mech AV-8/TAV | 191 | $32,661 | 0.95 | $34,344 | $32,661 | $67,005 | $13,843 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 6253 | Fixed Wing Airframe Mechanic EA-6 | 135 | $23,085 | 0.95 | $24,274 | $23,085 | $47,359 | $13,843 |
| 6256 | Fixed Wing Airframe Mechanic KC-130 | 183 | $31,293 | 0.95 | $32,905 | $31,293 | $64,198 | $13,843 |
| 6257 | Fixed Wing Airframe Mechanic F/A-18 | 152 | $25,992 | 0.95 | $27,331 | $25,992 | $53,323 | $13,843 |
| 6281 | Fixed Wing Airsafety Equip Mechanic Trainee | 75 | $12,825 | Imputed | $13,087 | $12,825 | $25,912 | $13,843 |
| 6282 | Fixed Wing Aircraft Safety Equip Mech AV-8 | 188 | $32,148 | 0.97 | $33,142 | $32,148 | $65,290 | $13,843 |
| 6283 | Fixed Wing Aircraft Safety Equip Mech EA-6 | 124 | $21,204 | 0.97 | $21,860 | $21,204 | $43,064 | $13,843 |
| 6286 | Fixed Wing Acft Safety Equip Mech KC-130 | 161 | $27,531 | 1.00 | $27,531 | $27,531 | $55,062 | $13,843 |
| 6287 | Fixed Wing Acft Safety Equip Mech F/A 18 | 154 | $26,334 | 0.97 | $27,148 | $26,334 | $53,482 | $13,843 |
| 6312 | Aircomm/Nav/Elec/ Wpns Systems Tech AV-8 | 277 | $47,367 | 0.91 | $51,938 | $47,367 | $99,305 | $14,275 |
| 6313 | Aircomm Systems Tech EA-6 | 260 | $44,460 | 0.91 | $48,750 | $44,460 | $93,210 | $14,275 |
| 6314 | UAV Avionics Technician | 389 | $66,519 | 0.93 | $71,526 | $66,519 | $138,045 | $14,275 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 6316 | Aircomm Navsys Tech K-130 | 261 | $44,631 | 0.91 | $48,938 | $44,631 | $93,569 | $14,275 |
| 6317 | Aircomm Navwpns Systems Tech F/A-18 | 303 | $51,813 | 0.91 | $56,813 | $51,813 | $108,626 | $14,275 |
| 6322 | Aircomm Navelec Systems Tech Ch-46 | 315 | $53,865 | 0.91 | $59,063 | $53,865 | $112,928 | $14,275 |
| 6323 | Aircomm Navelec Systems Tech Ch-53 | 331 | $56,601 | 0.91 | $62,063 | $56,601 | $118,664 | $14,275 |
| 6324 | Aircomm Navelec-wpns Systems Tech U/AH-1 | 343 | $58,653 | 0.91 | $64,313 | $58,653 | $122,966 | $14,275 |
| 6331 | Aircraft Electrical Systems Tech - Trainee | 230 | $39,330 | Imputed | $40,133 | $39,330 | $79,463 | $14,275 |
| 6332 | Aircraft Electrical Systems Tech AA-8 | 309 | $52,839 | 0.93 | $56,816 | $52,839 | $109,655 | $14,275 |
| 6333 | Airelec Systems Tech EA-6 | 293 | $50,103 | 0.93 | $53,874 | $50,103 | $103,977 | $14,275 |
| 6336 | Airelec Systems Tech KC-130 | 303 | $51,813 | 0.93 | $55,713 | $51,813 | $107,526 | $14,275 |
| 6337 | Aircraft Electrical Systems Tech F/A-18 | 293 | $50,103 | 0.93 | $53,874 | $50,103 | $103,977 | $14,275 |
| 6386 | Aircraft Electronic Countermeasures Tech, EA-6B | 223 | $38,133 | 0.91 | $41,813 | $38,133 | $79,946 | $14,275 |
| 6412 | Aircraft Communications Systems Tech | 365 | $62,415 | 0.79 | $78,608 | $62,415 | $141,023 | $14,276 |
| 6413 | Aircraft Navigation | 343 | $58,653 | 0.85 | $69,004 | $58,653 | $127,657 | $14,276 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| PMOS | PMOS name | Lateral-move calculations: A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
|---|---|---|---|---|---|---|---|---|
| 6423 | Aviation Electronics Micro-Miniature Repair (IMA) | 257 | $43,947 | 0.91 | $48,293 | $43,947 | $92,240 | $14,276 |
| 6432 | Aircraft Electrical/ Instrument/Flight Tech, IMA | 255 | $43,605 | 0.91 | $48,182 | $43,605 | $91,787 | $14,276 |
| 6433 | Aircraft Elec/Instru-ment/Flight Control | 365 | $62,415 | 0.91 | $68,967 | $62,415 | $131,382 | $14,276 |
| 6461 | Hybrid Test Set Tech IMA | 368 | $62,928 | 0.85 | $74,033 | $62,928 | $136,961 | $14,276 |
| 6462 | Avionics Test Set (ATS) Technician | 360 | $61,560 | 0.85 | $72,424 | $61,560 | $133,984 | $14,276 |
| 6463 | Radar Test Station/ Radar Sys Tech | 347 | $59,337 | 0.79 | $75,492 | $59,337 | $134,829 | $14,276 |
| 6464 | Airport Inertial Navi-gation System | 344 | $58,824 | 0.85 | $69,205 | $58,824 | $128,029 | $14,276 |
| 6466 | Acft Forward Looking Infrared | 356 | $60,876 | 0.85 | $71,619 | $60,876 | $132,495 | $14,276 |
| 6467 | Cass Tech IMA | 386 | $66,006 | 0.79 | $83,131 | $66,006 | $149,137 | $14,276 |
| 6468 | Aircraft Electrical Equip Test Set | 338 | $57,798 | Imputed | $58,978 | $57,798 | $116,776 | $14,276 |
| 6482 | Acft Electronics Countermeasurses | 376 | $64,296 | 0.79 | $80,977 | $64,296 | $145,273 | $14,276 |
| 6483 | Acft Electronic Countermeasurers | 379 | $64,809 | 0.79 | $81,623 | $64,809 | $146,432 | $14,276 |
| 6484 | Airelecctrsys Radcom/ Cat | 348 | $59,508 | 0.79 | $74,947 | $59,508 | $134,455 | $14,276 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 6492 | Avn Pme Calb Repair Tech | 414 | $70,794 | 0.75 | $93,866 | $70,794 | $164,660 | $14,276 |
| 6494 | Altis Spec | 320 | $54,720 | Imputed | $55,837 | $54,720 | $110,557 | $14,276 |
| 6531 | Aircraft Ordnance Technician | 150 | $25,650 | 0.99 | $25,909 | $25,650 | $51,559 | $15,216 |
| 6541 | Aviation Ordnance Systems Tech | 176 | $30,096 | 0.99 | $30,400 | $30,096 | $60,496 | $15,216 |
| 6672 | Aviation Supply Clerk | 84 | $14,364 | 0.95 | $15,120 | $14,364 | $29,484 | $16,932 |
| 6694 | Aviation Info Sys Spec | 425 | $72,675 | 0.97 | $74,923 | $72,675 | $147,598 | $16,932 |
| 6821,6842 | Weather Observer | 162 | $27,702 | 0.93 | $29,794 | $27,702 | $57,496 | $15,251 |
| 7011 | Esped Air Sys Tech | 113 | $19,323 | 0.96 | $20,065 | $19,323 | $39,388 | $15,247 |
| 7041 | Aviation Operations Specialist | 112 | $19,152 | 0.90 | $21,280 | $19,152 | $40,432 | $15,247 |
| 7051 | Acft Firefighting & Rescue Special | 159 | $27,189 | 0.93 | $29,235 | $27,189 | $56,424 | $15,247 |
| 7212 | Ladd Gunner | 148 | $25,308 | 0.94 | $26,923 | $25,308 | $52,231 | $14,226 |
| 7234,7236 | Air Command And Control Electronic | 188 | $32,148 | 0.88 | $36,615 | $32,148 | $68,763 | $14,226 |
| 7242 | Air Support Operations Operator | 150 | $25,650 | 0.85 | $30,176 | $25,650 | $55,826 | $14,226 |
| 7251 | Air Traffic Control Trainee | 103 | $17,613 | Imputed | $17,972 | $17,613 | $35,585 | $14,226 |
| 7257 | Air Traffic Controller | 426 | $72,846 | 0.75 | $97,128 | $72,846 | $169,974 | $14,226 |
| 7314 | UAV Air Vehicle Operator | 38 | $6,498 | 0.80 | $8,123 | $6,498 | $14,621 | $15,127 |

Table 24. Rough cost comparisons for increasing reenlistments through lateral moves or SRBs (continued)

| | | Lateral-move calculations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PMOS | PMOS name | A-school training days | Training cost[a] | Graduate rate | Training cost per graduate | Readiness cost[b] | Total cost/ lateral move[c] | SRB multiple (zero to one) |
| 7371 | Aerial Navigator-Trainee | 297 | $50,787 | Imputed | $51,823 | $50,787 | $102,610 | $15,127 |
| 7372 | First Navigator | 542 | $92,682 | 0.74 | $125,246 | $92,682 | $217,928 | $15,127 |
| 7381 | Airborne Radio Operator/Loadmaster (Trainee) | 247 | $42,237 | Imputed | $43,099 | $42,237 | $85,336 | $15,127 |
| 7382 | Airborne Radio Operator/Loadmaster | 519 | $88,749 | 0.74 | $119,931 | $88,749 | $208,680 | $15,127 |

a. Training cost is computed as 3 times the pay of an E-4 ($57/day) times the number of training days. Ammunition costs are added using North (1994) data, updated by the consumer price index.

b. Readiness cost is computed as training cost (minus cost of ammunition).

c. Sum of training and readiness cost.

# Appendix H: List of occfields

Table 25. Occfield names

| Occfield |
|---|
| 01 Personnel and Administration |
| 02 Intelligence |
| 03 Infantry |
| 04 Logistics |
| 05 Marine Air Ground Task Force (MAGTF) Plans |
| 06 Command and Control Systems |
| 08 Field Artillery |
| 11 Utilities |
| 13 Engineer, Construction, and Equipment |
| 18 Tanks and Assault Amphibious Vehicle |
| 21 Ordnance |
| 23 Ammunition and Explosive Ordnance Disposal |
| 25 Operational Communications |
| 26 Signals Intelligence/Ground Electronic Warfare |
| 28 Data/Communications Maintenance |
| 30 Supply Administration and Operations |
| 31 Traffic Management |
| 33 Food Service |
| 34 Auditing, Finance, and Accounting |
| 35 Motor Transport |
| 41 Marine Corps Exchange |
| 43 Public Affairs |
| 44 Legal Services |
| 46 Training, Printing, Production, and Visual Information Support |
| 55 Music |
| 57 Nuclear, Biological, and Chemical |
| 58 Military Police and Corrections |
| 59 Electronics Maintenance |
| 60 Aircraft Maintenance (Helicopter) |
| 61 Aircraft Maintenance |

Table 25. Occfield names (continued)

| Occfield |
| --- |
| 62 Fixed Wing Aircraft Maintenance |
| 63 Avionics |
| 64 Avionics |
| 65 Aviation Ordnance |
| 66 Aviation Supply |
| 68 Weather Service |
| 70 Airfield Service |
| 72 Air Control/Air Support/Antiair Warfare |
| 73 Air Traffic Control and Enlisted Flight Crews |

# Bibliography


Barry, R. W. "An Analysis of the Effect of the U.S. Marine Corps' Lump Sum Selective Reenlistment Bonus Program on Reenlistment Decisions," Master's Thesis for the Naval Postgraduate School, Dec 2001

Cylke, S., M. S. Goldberg, P. F. Hogan, and L. S. Mairs. *Estimation of the Personal Discount Rate: Evidence from Military Reenlistment Decisions,* 1982 (CNA Professional Paper 356)

Cymrot, D. J. *The Effects of Selective Reenlistment Bonuses on Retention,* Mar 1987 (CNA Research Memorandum 87-43)

Ehrenberg, R. G., and R. S. Smith. *Modern Labor Economics: Theory and Public Policy,* ed. 7. Reading, MA: Addison-Wesley, 2000

Goldberg, M. S. *A Survey of Enlisted Retention: Models and Findings,* Nov 2001 (CNA Research Memorandum D0004085.A2)

Goldberg, M. S., and J. T. Warner. *Determinants of Reenlistment and Extension Rates in the United States Marine Corps,* Nov 1982 (CNA Research Contribution 476)

Hansen, M. L. *Compensation and Enlisted Manning Shortfalls,* Sep 2000 (CNA Research Memorandum D0001998.A2)

Hansen, M. L., and J. W. Wenger. *Why Do Pay Elasticity Estimates Differ?* Mar 2002 (CNA Research Memorandum D0005644.A2)

Hansen, M. L., and J. W. Wenger with D. Gregory and L. G. Houck. *Construction of an ACOL Framework: Theoretical Guidelines and Practical Considerations,* Jul 2001 (CNA Research Memorandum D0004380.A1)

Hogan, P. F., and M. Black. "Reenlistment Models: Methodological Review" in C. L. Gilroy et al., eds. *Military Compensation and Personnel Retention: Models and Evidence.* United States Army Research Institute for the Behavioral and Social Sciences: Alexandria VA, Feb 1991

Hosek, J. R., and C. E. Peterson. *Reenlistment Bonuses and Retention Behavior,* Mar 1985 (RAND Report R-3199-ML)

Hosek, J. R., and M. Totten. *Does Perstempo Hurt Reenlistment?* (MR-990-OSD) Santa Monica, CA: RAND Corporation, 1998

Lee, L. G., and A. O. Quester. *Marriage and the Marine Corps,* Memorandum for the Director, Manpower Plans and Policy Division, Jan 2000 (CNA D0000025.A1)

Maddala, G. S. *Limited-Dependent and Qualitative Variables in Econometrics.* Cambridge: Cambridge University Press, 1983

Mayberry, P. W. *Validation of ASVAB Against Infantry Job Performance Scores,* Dec 1990 (CNA Research Memorandum 90-182)

Mayberry, P. W., and N. B. Carey. *Relationship Between ASVAB and Mechanical Maintenance Job Performance,* Mar 1993 (CNA Research Memorandum 92-192)

North, J. H. *A Cost-Effective Use of Selective Reenlistment Bonuses and Lateral Occupational Moves,* Sep 1994 (CNA Research Memorandum 94-105)

North, J. H. *How Successful are Lateral Occupational Specialty Moves?* Sep 1993 (CNA Research Memorandum 92-225)

Quester, A. O. *When Do Marines Get Married?* Memorandum for Deputy Chief of Staff, Manpower and Reserve Affairs, Sep 1998 (CNA 98-0343)

Quester, A. O., and A. M. Adedeji. *Reenlisting in the Marine Corps: The Impact of Bonuses, Grade and Dependency Status,* Jul 1991 (CNA Research Memorandum 91-64)

Quester, A. O., and K. S. Lawler. *Career Reenlistments in the Marine Corps: FY1980-1991,* Dec 1992 (CNA Research Memorandum 92-189)

Quester, A. O., et al. *Manpower Critical Indicators Study: Final Report,* Aug 2002 (CNA Research Memorandum D006494.A2)

Ross, D. L., MAJ. "An Analyisis of the Retention Effect of Using Lump Sum Payments for the U.S. Marine Corps Selective Reenlistment Bonus Program," Master's Thesis for the Naval Postgraduate School, Mar 2000

Steadman, G. W. *Longitudinal ARSTAT Tracking Files for Enlisted Marines,* Apr 1991 (CNA Information Memorandum 127)

United States General Accounting Office. *Retention Bonuses: More Direction and Oversight Needed,* Nov 1995 (GAO/NSIAD-96-42)

United States General Accounting Office. *Military Personnel: Management and Oversight of Selective Reenlistment Bonus Program Needs Improvement,* Nov 2002 (GAO-03-149)

Warner, J. T., and M. S. Goldberg. "The Influence of Non-Pecuniary Factors on Labor Supply: The Case of Navy Enlisted Personnel," *Review of Economics and Statistics,* 66(1), Feb 1984:26-35

Warner J. T., and S. Pleeter. "The Personal Discount Rate: Evidence from Military Downsizing Programs," *The American Economic Review,* vol. 91(1), Mar 2001:33-53

# List of figures

# List of tables